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Public transport versus the private car: a study of attitudes towards transport modes in Plymouth

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Aim

To investigate public attitudes towards public transport and the private car in Plymouth

Objectives

1) To investigate the attitudes of the public towards different modes of transport
2) To assess what affects transport mode choice amongst the general public
3) To consider what would encourage a change in transport mode by the public

1. Introduction and Literature Review

Introduction

The importance of sustainability, as defined in the Brundtland Report (1989) as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1989), is ever expanding. The concept of sustainability incorporates three elements, according to Newman and Kenworthy (1999): economic development, which involves sustaining economic growth; community development, which involves satisfying basic human needs; and ecological development, which involves conservation of the natural environment.

Over the last ten years, the role that transport has played within the sustainability agenda has been readily identified. While current trends in transport mode and use are recognised as unsustainable (Black and Nijkamp, 2002), the potential for change in the transport sector is seen as vital in achieving sustainable development on the whole.

The detrimental environmental impacts caused by 'unsustainable' transport have been widely publicised with reference to increasing carbon emissions along with the impacts of local air, water and noise pollution (Docherty and Shaw, 2008). The transport sector alone is thought to be responsible for over 20 per cent of global carbon dioxide emissions (Wachs, 2002). Furthermore, in 2007, transport was the second largest contributor to the UK's overall carbon dioxide emissions (22 per cent) producing 122 million tonnes compared with 110 million tonnes in 1990 (DEFRA, 2007). Yet unsustainable forms of transport contribute to an even wider range of societal issues. Congestion is said to 'constrain economic development' (Docherty and Shaw, 2008, p.3) and, in the UK, total road traffic has increased by 87 per cent over the last 20 years with road maintenance costing £2.75 billion in 2007 (Department for Transport [Dft], 2008). Excessive car use has been linked to unhealthier lifestyle choices (Sloman, 2006) and respiratory disease linked to exposure to local air pollution is said to cause 24,000 deaths annually in the UK (DETR, 2000). There is also the suggestion that transport infrastructural improvement initiatives are, at times, seen to worsen social exclusion as those without access to a car, for example, are unable to benefit from road investment schemes (Gilbert, 2002). It is therefore undeniable that, in order to achieve the overall goal of sustainable development both nationally and globally, sustainable transport initiatives must be implemented successfully (Hysing, 2009).

The concept of sustainable transport is centred on the three key areas: reducing travel demand and private transport use, replacement of non-sustainable transport modes with sustainable ones through the promotion of public transit and integrative land use and transport planning (Geezhuizen *et al*., 2002). Interestingly, Allopi and Sarkar (1997) suggest that rising car dependency is the primary obstacle facing the implementation of sustainable transport strategies. Car dependency is defined as high levels of per capita car travel, car orientated land use patterns and reduced transport alternatives (Litman and Laube, 2002). In Europe, every second person owns a car and between 80-90 per cent of all passenger kilometres are made by car (Exel and Rietveld, 2009). In the UK, car ownership increased by 30 per cent (1996-2006) (BBC News, 2009) aided by a rise in disposable income and a fall in the cost of motoring compared with rising costs of public transport (DfT, 2008). In 2005, cars

were responsible for 54 per cent of the UK's transport based carbon dioxide emissions (Figure 1.1) (DfT, 2007).

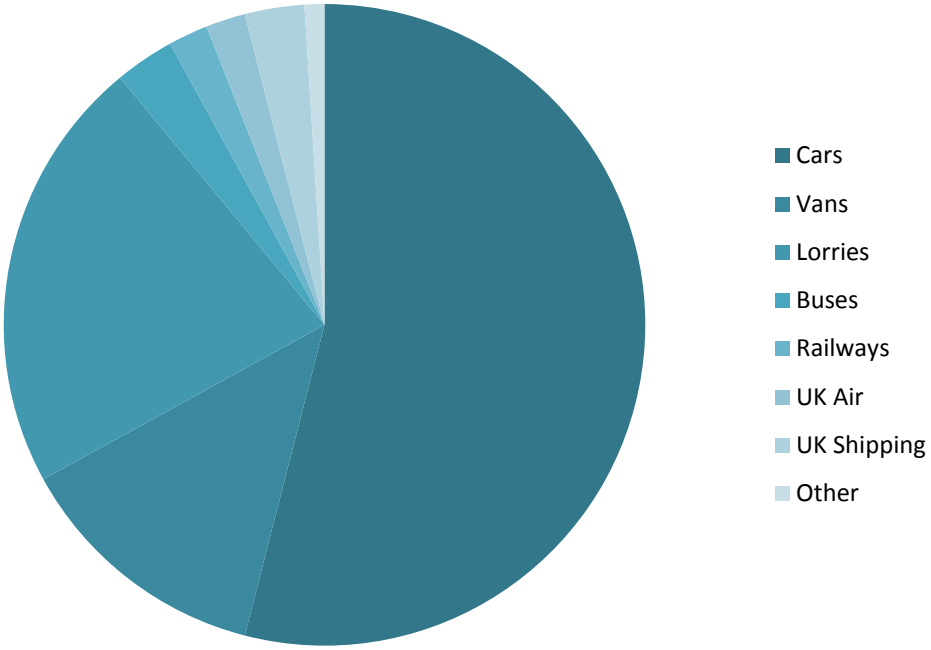

Figure 1.1: UK Domestic Transport Sector Carbon Dioxide Emissions in 2005 (DfT, 2007)

In contrast, bus patronage in the UK fell by 18 per cent (1980-1992). However, it rose again by 17 per cent in 2008, but still remains below its 1980 level (DfT, 2008). Accompanying this trend is a 17 per cent rise in public transport fares (1997-2008). Anderson and Stradling (2004, p.1) have noted that, although the 'disbenefits' of car use are increasingly clear, ownership and use have continued to rise. However, if sustainable development is to be considered, car use must decrease and alternative, more sustainable modes of transport made more attractive (Newman and Kenworthy, 1999).

The notion of sustainable transport together with reducing car dependency and increasing the use of public transport modes is widely advocated as a way to reduce the 'disbenefits' of rising motorised travel (Commission for Integrated Transport [CfIT], 2004). Such interests have therefore been adopted by international, national and local government bodies. In 2001, the European Commission published its White Paper *European Transport Policy for 2010: Time to Decide* (Commission of the European Communities, 2001) which set out a strategy focussed on achieving its sustainability goals through transport objectives. More recently *A Sustainable Future for Transport* (European Commission, 2009) was published in which the European Commission listed integration of transport networks, the use of more environmentally sustainable transport modes and improvement in the quality of services as essential in achieving its sustainable transport objectives. On the national scale, the UK government's *Transport 2010: The 10 year plan for transport* (DfT, 2000) was published with a primary aim of 'tackling congestion and pollution by improving all

types of transport'[1] (Docherty and Shaw, 2008). Subsequently, *Towards a Sustainable Transport System* (DfT, 2007) was published as a response to both the *Eddington Transport Study* (DfT, 2006)[2] and *The Stern Review* (HM Treasury, 2007)[3]. The document set out the government's transport plan to 2014 by identifying the provision of public transport as a key priority along with attempts such as road pricing to deter car use (DfT, 2007). Alongside the national aim of reducing car use, regional and local strategies have also been implemented. It can therefore be seen that the government, at all levels, is trying to encourage people out of their cars, whilst promoting the use of more sustainable transport modes. However, arguably not enough is being done as policies often fail at the implementation phase and are met by inertia from the public.

It has been suggested that, in order to reduce car use, behavioural changes are required from individuals (Steg, 2005). As policies aimed towards encouraging people to use public transport are inadequate, it can be proposed that investigating the reasons behind the trends will have considerable policy relevance. This study therefore aims to investigate public attitudes towards public and private transport; namely the bus versus the private car. It is suggested that by investigating the attitudes and perceptions of various social groups towards bus and car use, policy makers will be better able to tailor policies to overcome public inertia (Corpuz, 2007).

Literature Review

Anderson and Stradling (2004) investigated attitudes towards car use and modal shift in Scotland using postal questionnaires. They identified the importance of convenience as a factor which influences transport mode choice. They also identified a divergence in 'willingness' to change. They found that some people are able and willing to change transport modes, while others are less willing[4]. Anable (2005) also identified this trend. She separated the respondents of her questionnaire into six categories (Table 1.1).

[1] Public transport would be improved through targets to increase bus passenger journeys by 10%, to improve reliability, to create 2,812 miles of 'quality bus corridors' and to fund up to 1,500 other bus infrastructure measures including improvements at bus stops. Improved integration between transport modes was to be encouraged through the creation of local transport plans and urban congestion was to be eased through traffic management schemes and congestion charging (DfT, 2000).

[2] The report examined the' long-term links between transport and the UK's economic productivity, growth and stability' (DfT, 2006). It was suggested that, a high performing transport system will enable sustained economic prosperity by getting people to work, supporting productive labour markets and enabling international trade. The report recognised the need to reduce congestion and greenhouse gas emissions as they impact long term economic growth by contributing to climate change. It was also noted that delays and unreliability in the network have a direct cost to people and businesses (DfT, 2006).

[3] The Review examined the economic implications of climate change noting that a five degree temperature rise could lose 10 per cent of global output. The report identified the need to fight climate change through sustainability policy implementation sooner rather than later (HM Treasury, 2007).

[4] Those more willing and able to change transport modes tended to earn higher incomes, have access to all modes and be aged between 18-55. Those unable were over 60, the unemployed and those who were seen as 'deprived' (Anderson and Stradling, 2004).

Table 1.1: Transport user profiles (Anable, 2005)

Transport Profile	Description
Die Hard Driver	Fond of cars and car travel, believe in the right to drive cheaply and freely and have negative feelings towards all other travel modes
Complacent Car Addict	Admit the use of alternative modes is possible but do not feel any moral imperative or other incentive to alter their car use
Malcontented Motorist	Perceive higher constraints to the use of public transport despite feeling increasingly frustrated with car travel and believing they have a moral responsibility to change behaviour
Car-Less Crusader	Sacrificed car ownership for environmental reasons and have positive evaluations of all other modes
Reluctant Rider	Involuntary users of public transport due to health or financial reasons who would prefer to travel by car and aspire to own a car in the future
Aspiring Environmentalist	Already reduced their car use largely for environmental and health reasons but appreciate the practical advantages of car travel and are reluctant to give up ownership entirely

While the 'Die Hard Drivers' had no will to change modes, the 'Malcontented Morotists' were potentially more willing. Jensen (1999, p.21) also identified six mobility types ranging from those who would not want to give up their car, the so called 'Passionate Car Drivers', to those who use public transport out of necessity. He stated that, by targeting groups more susceptible and eager to change their transport behaviour, a more realistic solution to the unsustainable transport problem can be found[5].

A study based on ten focus groups was conducted by Guiver (2007) to investigate opinions towards bus and car travel. He found a divergence between the attitudes of people who had firsthand experience of a transport mode and those without. Generally, buses were discussed by car drivers in terms of worst-case scenarios in which respondents focussed on the intrusion of other people who appear to 'induce a sense of violation of integrity'(Guiver, 2007), p.237). In contrast, car drivers discussed cars as safe and private allowing the user to control the immediate environment. It was concluded that policy makers should focus on improving 'negative critical incidents'[6] as they are discussed more amongst users than everyday bus performance.

[5] It is then suggested that, the 'Passionate Car Drivers' can be targeted at a later stage when public transport on the whole can be seen to have been improved.

[6] It is stated that bus companies should address the worst aspects of their service such as late buses, unclean buses and unfriendly drivers (Guiver, 2007).

Gardner and Abraham (2007) studied commuters' travel to work transport choices in Brighton. They identified five core motives including journey time concerns and personal space concerns. They also stated that various misconceptions which included the perception of delays and problems associated with bus use, in contrast with the perception of control, even in the face of congestion, associated with car use. They suggested that, if these misconceptions were to be 'ironed out' by improving information and promoting experience on public transport modes, policy makers would be much more successful. In contrast, Ibrahim (2005) investigated the attitudes of people towards various transport modes for shopping purposes as shopper's priorities vary from that of other travellers. He found that factors such as suitability, practicality and ease of travel, are all important for shoppers in Singapore. He suggested that these are not as important to other kinds of travellers, although they must be taken into account when creating policies to encourage public transport use.

Steg (2005) used questionnaires to study motives for car use. She used three types of motives; instrumental motives, symbolic motives and affective motives[7]. She identified that car users relate to affective/symbolic aspects rather than instrumental factors. She suggested that the instrumental aspects of car use are more often targeted by policy makers, instead of the symbolic and affective motives which could potentially be more effective. Beirao and Cabral (2007) examined car and public transport user's attitudes towards various transport modes in Portugal. This qualitative study suggested that public transport services, in order to be successful, should be designed in a way that accommodated potential users; taking the focus away from those who are unwilling to change[8]. Corpuz (2007) analysed the Sydney Household Travel Survey to assess factors affecting mode choice in Sydney, Australia. He identified particular social characteristics in those more likely to use cars rather than public transport and vice versa[9]. He noted the importance of identifying the social characteristics of existing and potential public transport users in order to effectively target policy initiatives.

Having discussed past research, various key findings can be identified. Firstly, the importance of identifying user groups[10] is essential in targeting policy along with the identification of potential public transport users[11]. By noting those most willing to change and targeting them first, it is argued policy will be more effective[12]. Secondly, the identification of factors which influence mode choice is critical if public transport is to become a viable alternative as only when factors such as convenience are covered by both private and public transport can they both be considered equally usable. Thirdly, removing the barriers to public transport, it is noted, will aid policy

[7] Instrumental motives include the use of a transport mode due to its functional qualities, symbolic motives include using a particular mode due to the status and prestige it provides and affective motives include using a transport mode due to the enjoyment gained from it (Steg, 2005).

[8] For example, if those most likely to use bus services are of a lower income, prices should be at an affordable level.

[9] Car users, he stated, are aged between 31 to 60 years old, have a high income and often live in multi-vehicle households. In contrast, public transport users were predominantly those without driving licences, with no vehicles in the household and aged below 20 and above 60 (Corpuz, 2007).

[10] Through social and transport characteristics.

[11] Those willing to change transport modes.

[12] It is then suggested that policies targeting those most unwilling to change may have more success in the future as public transport is seen, on the whole, as a more realistic option.

success. Increasing the availability of public transport services, reducing its cost and promoting experience of services will improve negative attitudes and foster growth in the sector. Finally, the importance of investigating the various mode choices for specific journeys (commuting, shopping etc.) was noted. This would enable policy to plan for specific route coverage which coincides with local supermarket opening times and local shift patterns, for example.

It is clear that research in the sustainable transport field has covered many aspects, however, significant gaps exist when it comes to combining various elements into one study. Additionally, a large majority of the studies incorporate only qualitative or quantitative techniques which will affect the level of analysis and accuracy of the results collected (Flowerdew and Martin, 1997). This study intends to use a mixed methods approach in order to identify attitudes towards public transport and the private car in Plymouth[13]. In the past, there has been only limited focus on the social aspects of transport preference and, as noted by Donaghy *et al*. (2005), social change and transport have an interdependent relationship as one cannot function without the other. Therefore, this study will seek to identify the attitudinal preferences towards transport modes of various social groups as well as the social characteristics of those most willing to change. The policy context of the results found in the study will subsequently be identified.

Having discussed the context of the study with reference to sustainable transport initiatives, trends and shortcomings, it is now important to identify and justify the study area selected for investigation. Chapter two will therefore discuss the study area of Plymouth and the development of its transport network over time in line with changing policy agendas. Chapter three will discuss the studies methodologies with reference to how data was collected and how bias was reduced. Chapter 4 will present the results of the fieldwork conducted over a two month period and discuss the findings in light of national and local policy with reference to previous research in the field. Finally, chapter 5 will conclude the study by considering the policy context of the results and noting the contribution of this piece to transport research as a whole.

2. Study Area

As noted by Hysing (2009), selecting a suitable study area for geographical investigation is essential in order to conduct a meaningful analysis and contextualise theoretical processes. Therefore, with the aim of investigating attitudes towards public transport and the private car, the city of Plymouth, England, was selected. Plymouth provides a purposeful location for the study of sustainable transport and mode choice attitudes due to both the nature of its transport network and its socio-demographic characteristics, as will be discussed in this chapter. Firstly, the growth of Plymouth and the development of its transport network will be discussed. Thereafter, the transport policy context relevant to Plymouth, both locally and nationally, will be considered followed by an insight into Plymouth's existing network and sustainable transport provision. Finally, the selection of Plymouth for this study will be justified.

[13] The background to the study area of Plymouth and justification for its selection for investigation is discussed in Chapter 2.

The City of Plymouth: an introduction

From humble beginnings as a small fishing village, Plymouth has grown to become a significant sub-regional centre for housing, employment, education, healthcare and tourism (Figure 2.1).

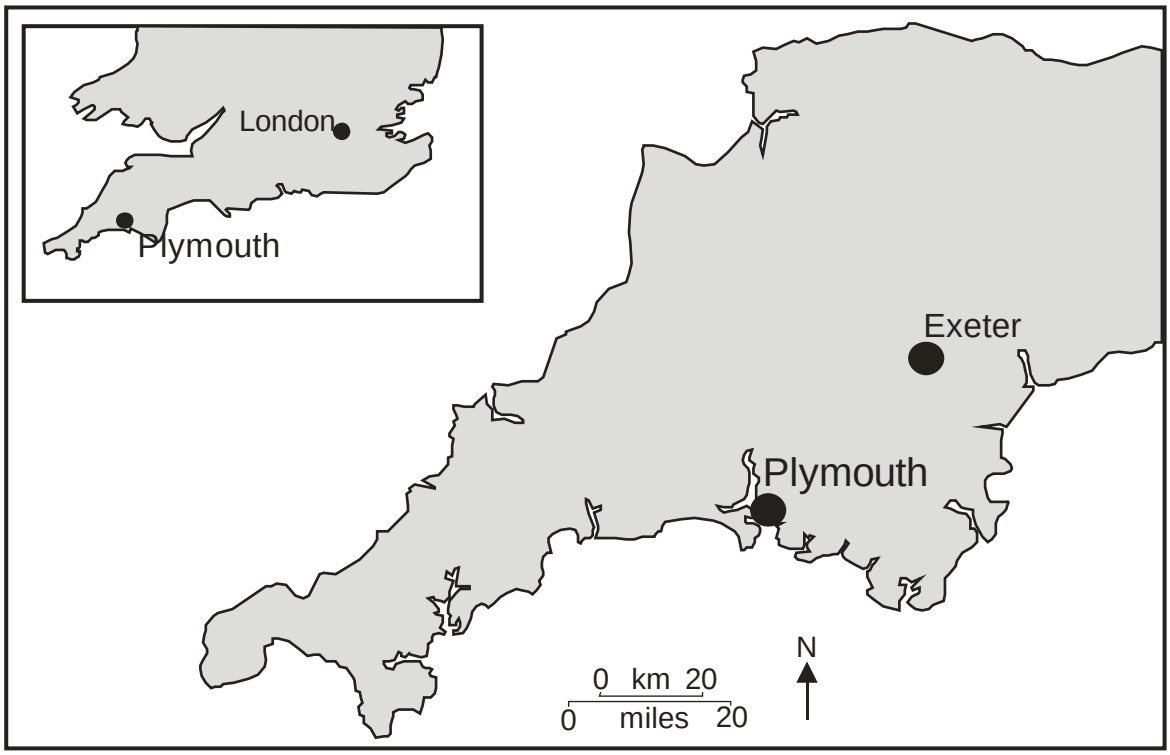

Figure 2.1: Plymouth's Regional and National Setting

With a population of 252,800 (Plymouth City Council [PCC], 2008a), the city covers an area of 79 square kilometres (PCC, 2008b) and has a high[14] population density of approximately 3000 people per square kilometre (PCC, 2008b). Plymouth not only supports its internal population of over 250,000 but also a travel to work population of 345,000 and a retail catchment of over 500,000 (PCC, 2006d). The city possesses a well developed multi-modal transport network with 871km of road within the city itself (PCC, 2006d), 190 registered bus services (PCC, 2006b), four daily flights from Plymouth City Airport to London Gatwick (PCC, 2006c) and over 4000 daily passenger movements from Plymouth Railway Station (PCC, 2006a).

The Growth of Plymouth and its Transport Network: 1200-1960

Plymouth began its life as the small port and fishing village of Sutton (Lambert, 2008). Declared a market town in the 13th century, the town grew despite its physical separation from other population centres.

The dockyard at Devonport, constructed in 1689, marked an important transition for the area. Along with a growth in industry came a growth in population. By the mid 18th century, Devonport had a population of over 4,000 (Moseley, 2007). The influx of population and trade in Plymouth lead to the demolition of the Plymouth town gates[15] which facilitated the construction of the 1758 turnpike road from Plymouth to

[14] The average population density of Inner London is estimated to be over 8,000 people per square kilometre (National Statistics, 2002).

[15] Located along a 16th century defensive wall which stretched across the city.

London along with Stonehouse Bridge in 1773 (Moseley, 2007). The first census was conducted in Plymouth in 1801 and illustrated the existence of three towns (Figure 2.2). Plymouth had a population of 19,000, Devonport had a population of 23,000 and Stonehouse had a population of 3,407 (Lambert, 2008).

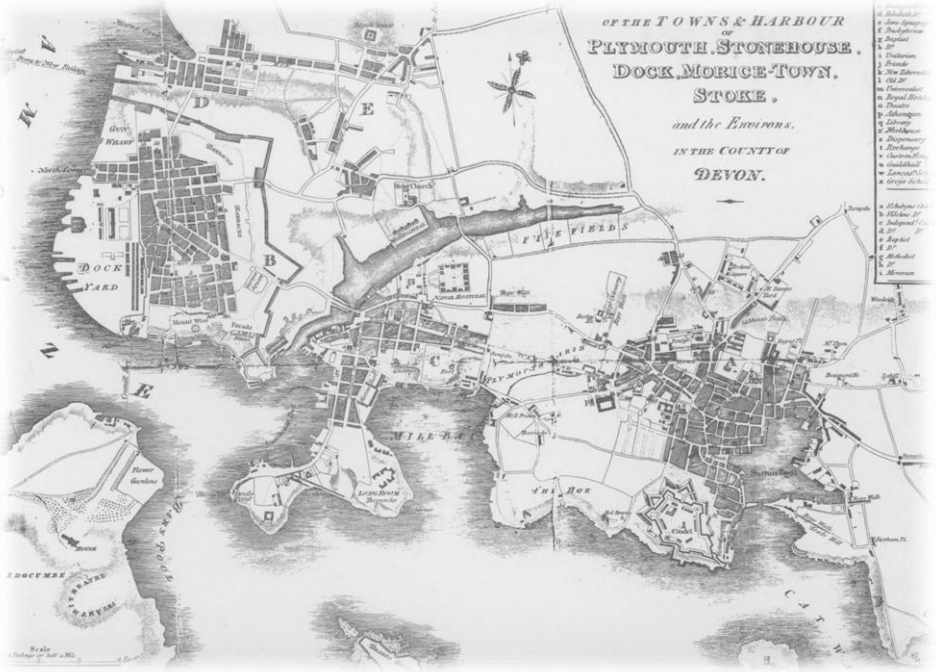

Figure 2.2: Plymouth 1820: The Three Towns (Drawn by John Cooke)(Johnson, 2009)

It has been suggested that the key to Plymouth's expansion was transport (Moseley, 2007). Until the 1820s, all transport in Plymouth was private. Plymouth's first form of public transport appeared in 1828 with the arrival of the horse drawn bus service (Figure 2.3) which originally ran between Plymouth and Devonport.

Figure 2.3: Plymouth's horse drawn bus service (Moseley, 2007)

Plymouth's 'pioneer' railway was the Plymouth and Dartmoor Railway (PDR), built by Sir Thomas Tyrwhitt in 1823, which connected Sutton Harbour with Princetown[16]

[16] The horse-drawn service was used largely to move granite down from Dartmoor for export in Plymouth (Chalkley *et al*., 1991, p.145).

(Chalkley *et al*., 1991, p.144). In 1844, the South Devon Railway (SDR) built a main line linking Exeter, Bristol and London. It reached Laira in 1848 and Millbay in 1849[17] (Gill, 1997). The opening of Brunel's Royal Albert Bridge in 1859, provided a fast rail connection into Cornwall reaching Truro and later Penzance in 1867 (Chalkley *et al*., 1991) (Figure 2.4).

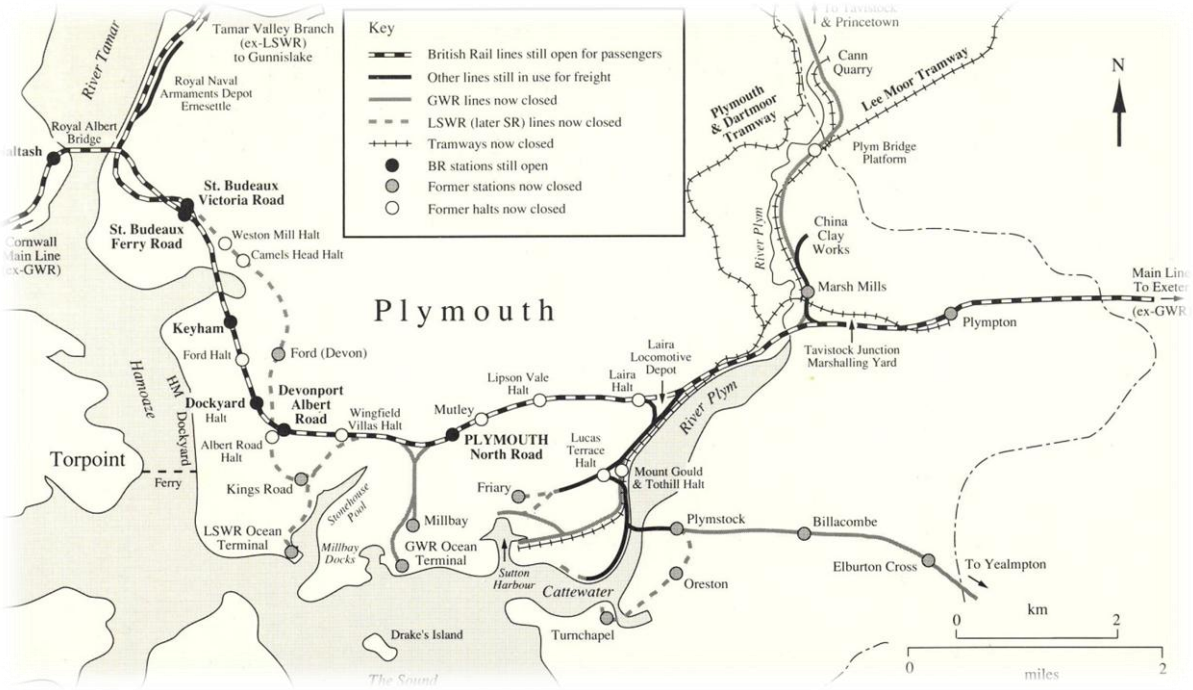

Figure 2.4: Plymouth's Rail Network (Chalkley *et al*., 1991)

From 1870 onwards, Millbay Docks began running transatlantic liners to North America (Crispin, 1994) opening a new dimension of travel for Plymouth's residents[18]. The next major development in Plymouth's transport network came in 1872 with the arrival of horse-drawn trams (Moseley, 2007), which initially ran between Plymouth and Devonport carrying 20-35 passengers.

In 1876, the SDR, running between Exeter and Plymouth (Gregory, 1982), and the Cornwall Railway (CR), running between Plymouth and Falmouth (Woodfin, 1960), were taken over by Great Western Railway (GWR). In the same year, the London and South Western Railway (LSWR) was extended[19] and reached Devonport in 1876 and Friary and Cattedown in 1878 (Gill, 1991) (Figure 2.5).

[17] The earliest trains from Plymouth to London Paddington took only six hours and forty-five minutes compared with twenty one hours which it had previously taken by stagecoach during the 1830s. Along with this substantial reduction in journey times came an increased capacity for third class passengers, who had formerly been served poorly (Chalkley *et al.,* 1991).

[18] Later services expanded out to reach South Africa, Australia, India and New Zealand (Crispin, 1994).

[19] Additional lines were also laid by the LSWR to take advantage of Plymouth's seaborne trade which reached Turnchapel and Oreston in 1897.

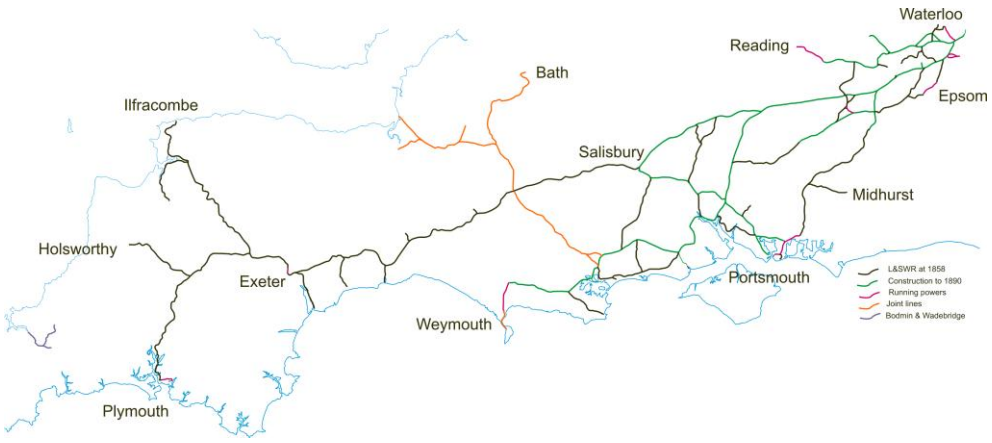

Figure 2.5: London and South Western Railway 1890 (Wikipedia Commons, 2009)

By 1899, Plymouth's tram network was expanded and electrified with services now running between Plymouth, Devonport, Mutley, Stoke, Keyham and Peverell. The new electric-powered trams were capable of carrying up to 42 passengers with an average speed of 8mph (Moseley, 2007) (Figure 2.6).

Figure 2.6: South Keyham Tramway in Plymouth 1875 (Johnson, 2010)

At the same time, the first private motor vehicles (Figure 2.7) were arriving in the city, opening a new travel dimension for the more affluent population.

Figure 2.7: Plymouth's first motor cars (Moseley, 2007)

By the beginning of the next century, all three towns had grown substantially. The 1901 Census revealed that Plymouth had a population of 107,000, Devonport of 64,000 and Stonehouse of 15,000 (Moseley, 2007). The amalgamation of the three founding towns of Plymouth occurred in 1914 under Local Government Provisional Order Confirmation No. 18 (Lambert, 2008). The official recognition of Plymouth as an urban borough further aided the development of transport provision in the city with the appearance of the first motor buses in 1920 and the construction of the A38 trunk road in 1922 (Bufford, 2009). In 1928, Plymouth was officially recognised as a city (Lambert, 2008).

Motor bus services allowed transport in Plymouth to reach out into the wider area with bus services connecting Plymouth with its sub-region[20]. Plymouth's airport, at Roborough, was opened officially in 1931 and provided access for Plymouth's population to other parts of the UK and later Europe (Moseley, 2007).

After the air raid bombardment of Plymouth during the Second World War, the tramways were removed due to extensive damage and in 1943 town planner Patrick Abercrombie was commissioned to create *A Plan for Plymouth* (Figure 2.8) to reconstruct the devastated city. This plan would see the re-design of the city centre into distinct land use zones[21] (While, 2006). The plan suggested that transport in the post-war era should be based around the private car as it is 'the most economic and convenient form of mechanical transport' (Chalkley *et* al., 1991, p.142).

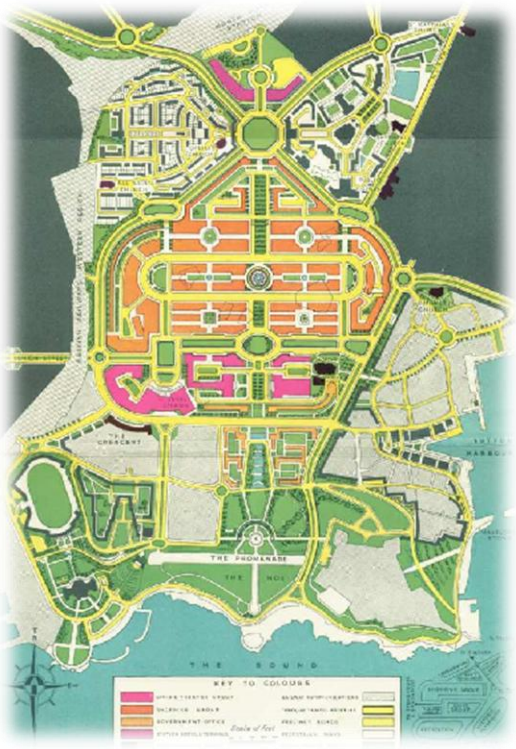

Figure 2.8: Abercrombie's Plan for Plymouth

[20] Bus services connected Plymouth with Plymstock, Ivybridge, Bigbury-on-Sea, Okehampton, Totnes, Torquay and Exeter (Mosely, 2007).

[21] With this in mind, all forms of transport were directed around the city centre via a large ring road with the aim of easing traffic flow and minimising congestion (While, 2006).

By the 1960s, Plymouth's transport network was fully operational: it had a functioning road network connecting all areas of the city and beyond, it had a bus network covering the city and its suburbs, railway linkages spanning the UK, an active airport providing travel predominantly within the UK, and a ferry port providing vital commercial links with Europe. However, Plymouth's transformation was not complete and changing agendas in national and local transport planning were to have an impact.

Changing Agenda's in Plymouth's Transport Planning: 1960-Present Day

With a transport network readily established, Plymouth was set to grow further. The 1950/60/70s saw rising affluence coupled with rising car ownership. In 1963, there were four times as many motor vehicles on the road as there were in 1939 (Glaister *et al*., 1998).

The government moved to facilitate high car use with 'predict and provide' road building policies (Docherty and Shaw, 2008), which saw the construction of motorways all over Britain. The M5, constructed in 1967, extended from the West Midlands to Exeter (Charlesworth, 1984) where it linked with the A38 providing a fast connection between Plymouth and the rest of the UK. Bus services in the UK were nationalised under the 1968 Transport Act which formed the National Bus Company (NBC) and led to the amalgamation of operators into larger units[22] (Bell and Cloke, 1990).

The 1980s signalled a drastic change in transport provision with the election of the Conservative government in 1979 (Glaister *et al*., 1998). The government aimed to induce free market competition through the deregulation and privatisation of bus services in the UK with the aim of reducing public sector spending and increasing efficiency (Bell and Cloke, 1990). The publication of the 1985 Transport Act therefore led to the break up and sale of the NBC in which Western National (a subsidiary of the National Bus Company covering South West England) was divided into four companies. Western National Ltd was to take over NBC services in Plymouth while PCC's undertakings were taken over by a private company; Plymouth Citybus Ltd which was formed in 1986 (Moseley, 2007). Other private companies were now able to run commercial services in direct competition with formally state owned services with the advantage of cheaper fares for passengers.

The 1980/90s saw the growth of the sustainable transport agenda in the UK following the publication of the Brundtland Report in 1987 which first noted the principle of sustainable development (Newman and Kenworthy, 1999). Publications including the ***UK Strategy for Sustainable Development*** and *A New Deal for Transport – Better for Everyone* (DfT, 1998) followed in the UK and showed a clear commitment to achieving sustainable transport. The government's commitment to sustainability, however, has become clearer over the last nine years. The publication of *Transport 2010: The 10 year plan for transport* (DfT, 2000), which aimed to tackle congestion and pollution by improvements in all types of transport (Docherty and Shaw, 2008), was later followed by *Towards a Sustainable Transport System* (DfT, 2007). The changing national agenda has undoubtedly had its effect on regional and local policy as can be seen in Plymouth.

[22] Plymouth's formerly privately owned bus services were thereafter operated by Western National (Moseley, 2007).

Plymouth's Transport Present: a Sustainable Transport Future?

Changing agendas over time have had their impact on transport policy in the city of Plymouth. Most recently, sustainable transport has become an inclusive part of policy making. The *South West Regional Spatial Strategy* identified the provision of sustainable transport as key to 'unlocking Plymouth's growth potential' (South West Regional Assembly, 2006). In the city, *A Vision for Plymouth* (Mackay, 2004) identified the need for investment in high quality public transport as well as a 'step change' in the city's sustainable transport infrastructure'. As a result, in 2001 PCC published the city's *Local Transport Plan* (LTP) which ended in 2006. This plan covered all transport modes in Plymouth with the aim of improving quality and encouraging modal shift away from the private car. After its completion, Plymouth's second *Local Transport Plan* (LTP2) was published. Set to cover the period 2006-2011, the plan provided key policy objectives to achieve various transport goals within the city. Sustainable transport is a common thread throughout *LTP2.* Key Principle 2 (meeting current and future needs) states the 'delivery of sustainable transport solutions' as a key priority and Key Principle 4 aims to encourage more sustainable travel demand by 'broadening the travel choices available' (PCC, 2006a).

However, despite PCC's obvious commitment to the provision of sustainable transport opportunities in the city, car ownership is rising while public transport (particularly bus) patronage falls (PCC, 2006a). Car ownership in Plymouth increased by 11 per cent between 1991 and 2001, with 70 per cent of households owning at least one car (PCC, 2001). Although Plymouth has relatively low car ownership compared with its sub-region and the national average (Table 2.1), cars have above average modal share in journeys to work and school in Plymouth (Table 2.2; 2.3).

Table 2.1: Car Ownership Comparison (PCC, 2006a; Leibling, 2008)

	Plymouth	**Sub-Region**	**UK**
Car Ownership	70%	80%	77%

Table 2.2: Mode Share for Journeys to Work (PCC, 2006a)

Mode	**Plymouth**	**UK**
Car	62%	61%
Bus	13%	8%
Walk	13%	10%
Bicycle	3%	3%
Motorcycle	2%	1%
Train	0	7%

Table 2.3: Mode Share for Journeys to School (PCC, 2006a)

Mode	**Plymouth**	**UK**
Walk	52%	48%
Car	36%	30%
Public Transport	9%	19%
Other	0.9%	3%
Bicycle	0.5%	1%

Furthermore, bus patronage has declined steadily over the past five years. In 2003, there were 21 million bus passenger journeys. By 2005, the number had fallen to 18.7 million; a decline of 12 per cent (PCC, 2006a). Bus passenger satisfaction is also below the council's target of 70 per cent by 2008 at only 62 per cent (PCC, 2008c). The problem of declining bus patronage may worsen due to the sale of the council owned bus company Citybus Ltd in 2009 due to the impact of potentially increased fares and reduced route options (This is Plymouth, 2009).

With these issues in mind, this study aims to investigate public attitudes towards both public transport and the private car in Plymouth. The focus of the study will be on car and bus travel as, although rail travel enhances Plymouth's longer distance connections, few people living and working within Plymouth are thought to use the rail services on a daily basis for travel within the city boundary (PCC, 2006a). In addition, Daugherty *et al.* (1999, p.5) noted that the Government see buses as a realistic alternative to the car as they offer 'relatively low running costs, route flexibility and permeability into city centres'. Currently buses carry 70 per cent of all public transport passengers and it is noted that 'no other mode can deliver patronage growth as quickly or cost effectively' (CfIT, 2002, p.5).

Similar information, regarding public attitudes towards various transport modes in Plymouth, already exists and was collected by PCC in 2004/05. In March 2004, *Plymouth's Interim Transport Plan Consultation* identified information including 69 per cent of respondents using a car to commute and 72 per cent using a car to go to the supermarket (PCC, 2006e). *Plymouth Points of View* (2004) identified reliability, frequency and value for money as key points to consider when aiming to improve public transport use (PCC, 2006e). Additionally, on street interviews conducted in 2005 by PCC noted a wish for more reliable bus services, faster travel times and improved services to supermarkets out of town (PCC, 2006e). It can therefore be seen that, although information on attitudes towards public transport and the private car has already been obtained by PCC, it has arguably not been implemented successfully in policy initiatives[23].

It has been suggested that urban areas offer unique opportunities for dealing with unsustainable transport (Hysing, 2009). Banister (2005) notes that high concentrations of people make public transport a viable alternative to the private car as networks are able to reach the population more easily and offer a high level of service quality. Therefore, it can be suggested that, due to its high population density and growing population, Plymouth offers a suitable area for study as its potential to achieve a sustainable transport network is great. In addition, Plymouth is experiencing increasing car ownership coupled with declining bus patronage providing much room for growth and improvement in the sustainable transport field. As well as appropriate transport systems for study, Plymouth's population demographic arguably offers potential in achieving sustainable transport goals. Donaghy *et al*. (2005) stated that an ageing population is seen as a positive asset when aiming to promote the use of public transport; in Plymouth, one third of the population is aged over 50. Furthermore, high concentrations of social deprivation and poverty have been identified in various inner city wards in Plymouth (PCC,

[23] Additionally, the information collected failed to identify the specific attitudes and opinions of the various user groups. It can be suggested that the identification of user group attitudes, opinions and preferences is the key to achieving successful sustainable transport initiatives.

2006a) and it is thought that poor access to public transport can contribute to social exclusion and deprivation (Hine and Mitchell, 2003).

It can therefore be seen that Plymouth provides a purposeful study area in the investigation of public attitudes towards transport modes. Not only does the area demonstrate signs of policy failure despite existing strategies, it also demonstrates excellent potential for the future achievement of sustainable transport objectives.

With a study area selected, it was then essential to formulate an appropriate methodology in order to collect accurate and representative information. It was first important to identify an appropriate sampling strategy in order to maximise the representativeness of the study. Subsequently, data collection techniques were chosen, in line with the sampling strategy, and implemented. The methodological formation and data collection process will be discussed in the following chapter.

3. Methodology

As Kitchin and Tate (2000, p.1) point out 'research is a process of enquiry and discovery' which aims to provide a deeper understanding of the relationships between 'humans, space, place and the environment'. The aim of this study is to investigate public attitudes towards public transport and the private car in Plymouth. Beirao and Cabral **(**2007) suggested that the sustainable transport and travel behaviour literature is a wide and complex sphere of work incorporating a multitude of geographical complexities. It is therefore essential that a clear, concise and appropriate research methodology is selected in order to allow a thorough understanding of the specific issues under investigation (Cresswell, 2003).

It has been suggested that qualitative research is vital in understanding 'the complexity of transport behaviour' (Donovan *et al.*, 1994 p.4), however, Flowerdew and Martin (1997) also recognise the importance of quantitative methods describing them as an indispensable tool which allow quantifiable conclusions about behaviour to be made. Consequently, a mixed methods approach (Cresswell, 2003) has been used in this study. This research strategy crosses the boundaries of conventional paradigms of research by 'deliberately combining methods with different underlying assumptions' (Denscombe, 2007, p.107). The mixed method approach aims to combine various research methods within a single research project with the advantage of improved accuracy and confidence in conclusions by providing various routes to the same result (Hoggart *et al.*, 2002). A combination of semi-structured interviews and questionnaire surveys were used in this study in order to investigate public attitudes towards transport modes in Plymouth in a sequential mixed methods approach (Cresswell, 2003); qualitative followed by quantitative.

Qualitative Research: Semi-Structured Interview Development and Procedure

According to Eyles (1988, p.12) an interview is a 'conversation with a purpose' which enables the researcher to collect descriptive and explanatory information in a people-orientated manner. In this study, a set of ten semi-structured interviews with members of the public were used to collect a set of rich, detailed and multi-layered responses (Burgess, 1984). It has also been suggested that qualitative research methods are valuable as they allow respondents to raise issues and specify factors which are important to them (Beirao and Cabral, 2007).

The first step was to establish a set of open questions which would provide the 'backbone' of the interviews themselves (Guiver, 2007, p.235). Each participant was asked to answer ten closed questions aimed to gather general information[24] which would enable more detailed analysis of the data at a later stage. Thereafter, each participant was asked a set of seven base[25] open questions covering aspects including factors affecting transport mode choice, attitudes and opinions towards different transport modes and thoughts on potential for a change in mode. A semi-structured format was chosen as it allowed a clear set of issues to be discussed flexibly, whilst keeping the topic clear and focussed at all times (Desncombe, 2008).

All participants were members of the general public with a mixture of regular and occasional public transport and car users[26]. The sample was also stratified with an equal balance of both male and female participants in order to gain insight into gender based attitudes. Additionally, it was assured that the participant's post code, average income and occupational status varied in order to optimise the coverage of various social groups within the sample with the aim of maximising the representativeness and reducing bias towards a particular social group (Table 3.1).

Table 3.1: Semi-structured interview respondent characteristics

Interview	Age	Gender	Post Code	Income	Occupation	Driving Licence	User Group
1	34	Female	PL6	£27,500	Full Time	Yes	Car
2	26	Male	PL5	£22,000	Full Time	Yes	Bus
3	45	Male	PL2	£25,000	Part Time	Yes	Car
4	28	Female	PL4	£22,000	Full Time	Yes	Bus/Car
5	68	Female	PL6	<£15,000	Retired	No	Bus
6	20	Male	PL4	<£15,000	Student	Yes	Car
7	35	Female	PL9	£18,000	Part Time	No	Bus
8	52	Female	PL3	£45,000	Full Time	Yes	Car
9	19	Male	PL4	<£15,000	Student	Yes	Bus/Car
10	41	Male	PL9	£30,000	Full Time	Yes	Bus/Car

The participant selection and interview process is described in Box 3.1. In this study, semi-structured interviews have been used in order to supply a rich and descriptive range of information relating specifically to each participants individual thoughts, opinions and behaviours (Handy *et al.*, 2005). It has also been suggested, that this qualitative technique is especially useful in travel behavioural research as it enables the researcher to assess the sources of various behaviours and opinions in order to predict the impact of future developments (Clifton and Handy, 2001). As well as a source of primary data, the interviews from this study have also been used to inform the development of the questionnaire study by identifying key topic areas for inclusion[27].

[24] Such as age, gender, average income and occupational status.

[25] Each interview was based on a set of 'base questions' which then led onto further discussion.

[26] Four regular car users, three regular public transport (bus) users and three respondents using both.

[27] The various motivating factors noted by interview participants were collated and featured in Section C (Question 7) of the questionnaire. This removed bias based on researcher knowledge as all categories were chosen by members of the public rather than the researcher (Beirao and Cabral, 2007). Additionally, the five

Respondents were selected at random at locations throughout Plymouth city centre. Passers-by were approached and asked to identify how often they travelled by car and/or bus in order to collect data from the three user groups under study: car users, bus users and users of both. If interest was shown, the members of the public were asked to take part in a short ten minute interview on transport attitudes and perceptions. All interviews took place in June 2008, during the day in a coffee shop on Plymouth high street, with permission from the manager, as it is important that the participant feels comfortable with the presence of the researcher and the surrounding environment (Denscombe, 2008).

Box 3.1: Quantitative Study: Participant selection and interview process

Quantitative Research: Questionnaire Design, Development and Procedure

It has been noted that the questionnaire survey is an indispensable tool in human geography when data involving people's behaviour, attitudes and opinions is required (Flowerdew and Martin, 1997). Beirao and Cabral (2007) state that questionnaires have the advantage of measuring reactions to a limited set of questions which thereafter allows for statistical analysis to take place. In this study, one hundred questionnaire surveys were completed by members of the public which would later be analysed alongside the qualitative data collected from the interview process. This was considered to be a reasonable number to collect in the one month data collection period in July 2009. Also, this number would provide a sufficient set of empirical data which would enable an accurate analysis and relevant conclusions to be drawn. Additionally, one hundred questionnaires would enable a sufficient coverage of the three user groups (car, bus, both) as well as other social sub-divisions (age, gender, income, etc).

First, a pilot questionnaire (Appendix 1) was put together using information obtained during the interview process. Flowerdew and Martin (1997, p.102) state that a 'pilot sample is essential' and should be used in order to limit the use of unnecessary questions. The pilot questionnaire was tested on fifteen members of the public. The original questionnaire had twenty four questions which came two formats; closed questions and open questions (Toyne and Newby, 1971). The pilot study identified various weaknesses in the questionnaire design. First, the questionnaire was too long with twenty four questions stretching across three pages; it has been stated that if the length of the questionnaire is excessive data quality will suffer (Kitchin and Tate, 2000). Additionally some of the questions were too long and were poorly worded (Figure 3.1).

Question 12. What would you say are the most important factors you consider when choosing which transport mode you use?

Figure 3.1: Excerpt from pilot study

most common journeys mentioned by interview participants were later included in Question 8 of the questionnaire.

The questionnaire was also very repetitive with only two different types of questions (open and closed).

As noted by Flowerdew and Martin (1997, p.89) 'a thoughtfully designed questionnaire is one which deploys a number of different question types'. Therefore, in light of the findings of the pilot study, the questionnaire was separated into four sections (Box 3.2) to create identifiable topics for the respondent (Appendix 2).

> The first section focused on questions relevant to objective one with the use of scaled questions and open ended questions which would allow the respondent to express their attitudes and opinions (Oppenheim, 1992). The second section would focus questions towards objective two with the use of multiple choice, tick boxes and an open question which would give the respondent the freedom to expand their own ideas (Cresswell, 2003). The third section would focus questions towards objective three with the use of a closed and open question. The final section would contain closed questions collecting general information about the participant and their travel behaviour in order to collect precoded data (Hoggart *et al*., 2002), which would enable comparisons, trends and patterns to be identified in regard to the research question. This section featured at the end of the questionnaire in order to reduce the refusal rate as 'respondents are less likely to take part if confronted with an onset of personal questions' (Denscombe, 2008, p.98).

Box 3.2: Quantitative Study: Questionnaire description

The one hundred questionnaire surveys were carried out in July 2009 at various locations throughout Plymouth's city centre (Table 3.2) (Figure 3.2).

Table 3.2: Location of Questionnaires Completed

Location of Survey	Number of Questionnaires Completed
Armada Way	19
Mayflower Street	12
Cornwall Street	16
New George Street	20
Royal Parade	15
Drake Circus	18

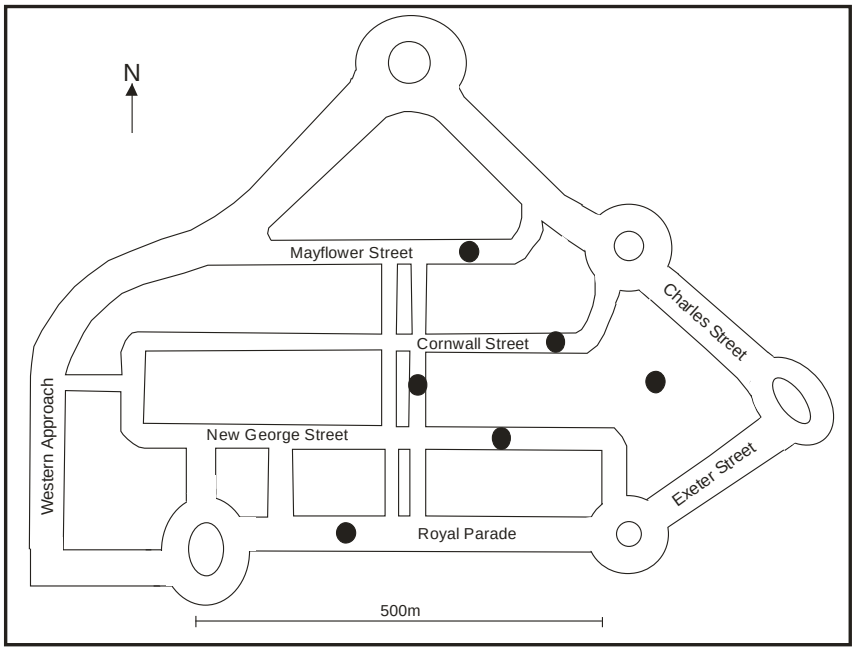

Figure 3.2: Location of Questionnaires Completed

Surveys were collected at various times of day and various days during the week in order to minimise bias and increase the representativeness of the sample taken by maximising the coverage of various social groups. For example, it is more likely to find a larger proportion of those in full time work between the age of 18-60 during the lunch hour period and certain shops my attract younger or older members of the public on varying incomes (Toyne and Newby, 1971). It was therefore essential to reduce the likeliness of collecting data from a narrow, false representation of the population.

Members of the public were selected at random and asked to take part in the survey. The data collected from the questionnaire surveys would provide the main form of primary data in the study.

Sampling Strategy

Flowerdew and Martin (1997**,** p.86) suggest that 'good survey design is achieved by attempting to anticipate and minimise various types of error which may ruin the reliability or validity of the data'. Quota sampling has been used in this study and involves the identification of categories necessary for inclusion in the sample and seeks to fill them in proportion to their existence in the population as a whole (Denscombe, 2007). In this study, gender and age were selected as both categories have important implications in transport mode behaviour. As noted by Black and Nijkamp (2002), various trends have been identified linking age with transport mode choice. It has been seen that those over 60 are more likely to use public transport in comparison to those aged between 25 and 40 who more often choose to drive. Additionally, differences in mode choice have also been identified between different genders with women seen as more likely and willing to use public transport than men (Black and Nijkamp, 2002).

However, quota sampling involves non-probability/random selection of respondents who are selected on a 'first to hand' basis rather than completely at random (Denscombe, 2007, p.15). This form of sampling will ensure the representation of all

crucial categories for investigation however; it may reduce the sample size. Therefore, given the time frame for data collection of two months, the size of the sample under investigation included ten semi-structured interviews and one hundred questionnaires. This number would allow sufficient data for analysis whilst retaining an effective coverage of crucial categories. Guiver (2007, p.236) noted the importance of a representative sample and added that the sample 'needs to include a sufficient number'. The sample in this study represents only 0.05 per cent of the population of Plymouth. However, by sampling quota's based on age[28] and gender in line with Plymouth's actual population statistics the representativeness of the sample has been increased (Table 3.3).

Table 3.3: Plymouth's population versus sample population

	Total	**Percentage**	**Total**	**Percentage**
Population	252,800	100%	100	100
Population in Sample	212,000	84%	100	100
Age				
17-25	43,300	20%	20	20%
26-35	33,500	16%	16	16%
36-45	34,900	16%	16	16%
46-55	31,500	15%	15	15%
56-65	28,800	14%	14	14%
65+	40,000	19%	19	19%
Gender				
Male	124,600	49%	49	49%
Female	128,200	51%	51	51%
Income				
<£15,000	Not Available	Not Available	41	41%
£16-25,000	Not Available	Not Available	30	30%
£26-35,000	Not Available	Not Available	17	17%
£36-40,000	Not Available	Not Available	7	7%
Over £40,000	Not Available	Not Available	5	5%
Occupation				
Full Time	78362*	45%	36	36%
Part Time	22675*	13%	25	25%
Student	6144*	4%	6	6%
Unemployed	5649*	3%	11	11%
Other	62304*	36%	22	22%

*Data from Plymouth City only

[28] Age quotas were based on the population covered in the sample (212,000) rather than the population as a whole (252,800) as those aged under 17 (16 per cent of Plymouth's total population) were not covered in the study.

Additionally, the random occurrence of the remaining social characteristics of the sample (postcode, income[29], occupational status), has accounted for the relatively small sample size as various groups are represented as they occurred during data collection. This has also reduced bias which otherwise may have meant an uneven coverage and therefore under-representation or over-representation of certain groups. As age and gender were quota sampled to mirror Plymouth's actual population and other characteristics occurred randomly, it can be suggested that this study can be seen as representative.

Methodology Critique and Improvement

The use of comprehensive research techniques is a crucial element in the success of a research project (Grosvenor, 2000). In this case, both techniques proved extremely successful both in practise and in reference to the results collected.

The use of quota sampling enabled the collection of accurate results based on a representative sample as population characteristics (age and gender) in reality were mirrored in the study (Table 3.3). In addition, the random nature of the remaining characteristics meant that pre-judged user and social groups were not represented. Instead, those who were represented consisted of a random and therefore non biased sample.

The collection of ten semi-structured interviews and one hundred questionnaires enabled a sufficiently large sample of the population to be studied. A vast array of results enabled a clear and accurate analysis which can be considered representative (Denscombe, 2007). However, in the future, it may be useful to focus data collection on one particular sub-group of the population, such as gender, in a male versus female transport attitudes study for example, enabling the researcher to investigate transport attitudes in even greater depth.

The mixed method approach, although proving to be time consuming, enabled convergence, corroboration and correspondence between the two sets of results (Green *et al*., 1989, p.259). In addition, the accuracy of the results can be guaranteed through the similarity of the findings from both data collection methods (Cresswell, 2003). The mixed methods approach also enabled any bias in one method to be offset by combining the two methods.

Data collection itself proved to be simple and effective. The use of a voice recorder during the questionnaire collection stage may have further improved its efficiency. As some of the questions were open, often respondents discussed their answers in greater detail than could be written down in the short space and short amount of time available. On the whole, the public were easy to approach and more than willing to take part in the study. It is therefore possible to suggest both semi-structured interviews and questionnaire surveys were successful methods of data collection in this study.

With an appropriate sampling strategy and methodology in place, data collection could take place. Chapter 4 will discuss the results from the data collection stage and their relevance to the research question. The policy context and context within the wider sustainable transport literature will also be discussed.

[29] Household income statistics for Plymouth's actual population were unavailable.

4. Results and Discussion

With data collection complete, the results could be analysed and presented to allow conclusions to be drawn. The various findings associated with the user groups under study are presented below. Firstly, the key findings are discussed with reference to transport attitudinal literature and previous studies. Subsequently, the context of the findings are identified and their policy relevance analysed. The feasibility of various policy options in Plymouth will further be discussed.

Attitudes and Perceptions of Transport Modes in Plymouth

As noted by Corpuz (2007), in order to implement successful sustainable transport policies, the attitudes and perceptions of various social groups must be understood and incorporated into policy making. The results of this study show an important divergence on attitudes by users towards both transport modes under investigation; the car and the bus.

Bus users, females and those aged under 35 and over 65 spoke most positively about bus services in Plymouth with bus users noting there were frequent services covering a wide area which are 'almost always on time' (Respondent 5; Appendix 7) (Figure 4.1).

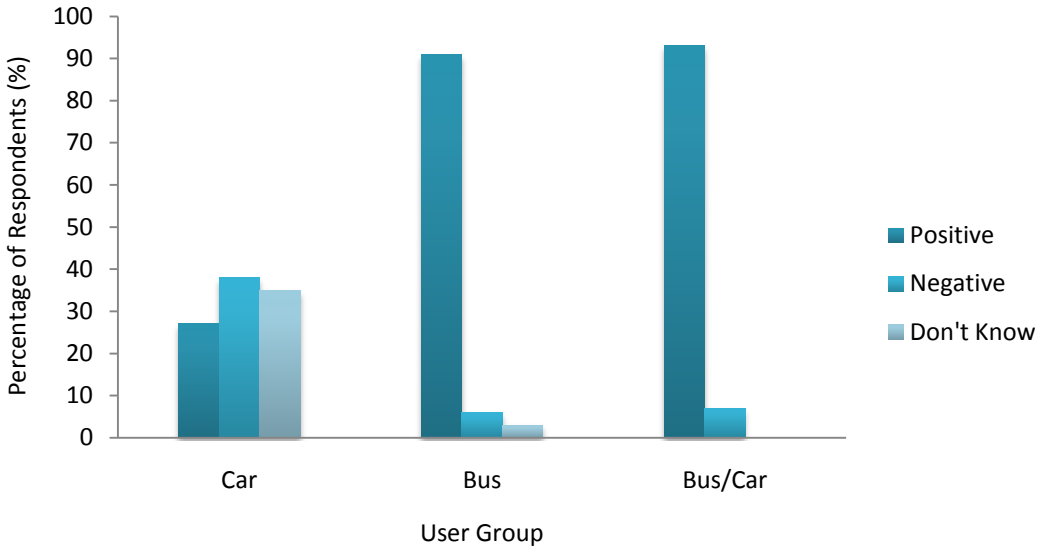

Figure 4.1: Attitudes towards bus services in Plymouth by user group

Female respondents stated services were affordable, frequent and 'probably faster than driving' (Respondent 7; Appendix 9) (Figure 4.2) and one interview respondent over 65 noted her appreciation of the free bus pass available for over 60s (Respondent 5; Appendix 7) (Figure 4.3).

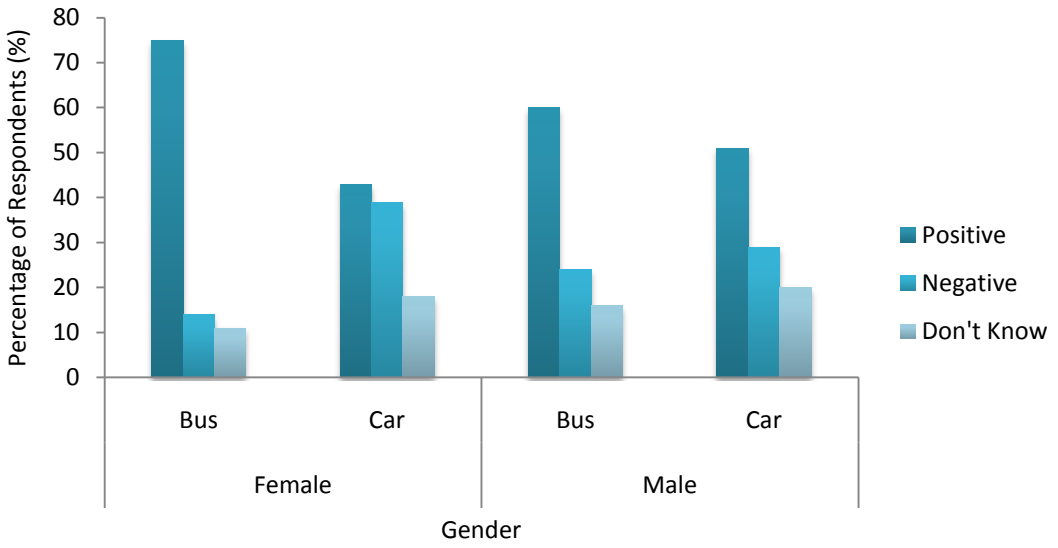

Figure 4.2: Attitudes towards transport in Plymouth by gender

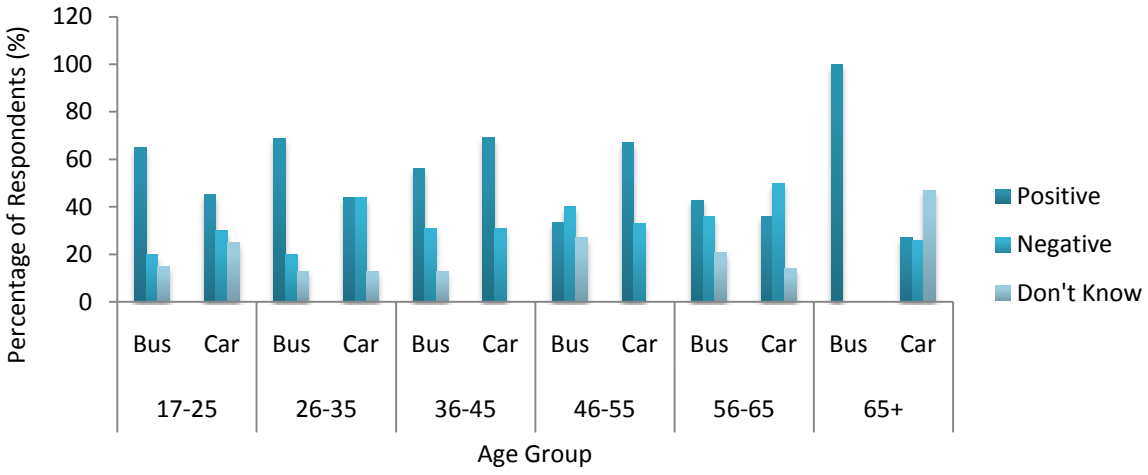

Figure 4.3: Attitudes towards transport in Plymouth by age group

In contrast, car users, males and those aged between 36-65 discussed bus services in Plymouth most negatively with car users stating services took indirect routes and were 'probably always late' (Respondent 6; Appendix 8) (Figure 4.1; 4.2; 4.3). Male respondents focussed on unreliability and the existence of too many operators (Respondent 3; Appendix 5).

"It's just so confusing and totally impossible to get your head around' (Respondent 3).

Those aged between 36 and 65 discussed perceived long travel times by bus (Figure 4.3) (Respondent 1; Appendix 3).

"I don't have the time to wait around for the bus, it seems like they are always sitting in traffic. And whenever I've used them they have gone long complicated routes to get where I wanted to go" (Respondent 1)

Car travel in Plymouth was viewed negatively by all user groups (Figure 4.4), with high dissatisfaction coming from car users, females (Figure 4.2) and those aged between 56 and 65 (Figure 4.3).

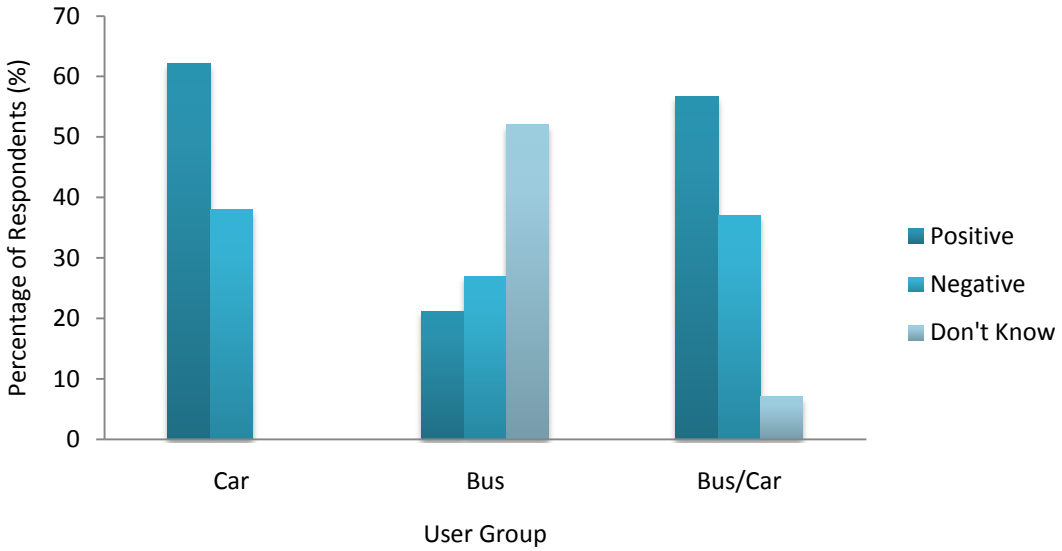

Figure 4.4: Attitudes towards car travel in Plymouth by user group

All discussed excessive traffic and expensive parking, while female respondents often stated car travel was stressful, time consuming and expensive (Figure 4.2).

However, although presenting negative aspects to car use, car users also noted the availability of parking as a positive attribute to car travel in Plymouth (Figure 4.4) (Respondent 8; Appendix 10).

"There are car parks everywhere in the city centre, you can pretty much always find a space somewhere. You will probably be queuing a while for it but you'll get one" (Respondent 8)

Male respondents also spoke positively stating the convenience and speed of car travel in Plymouth (Figure 4.2) (Respondent 6; Appendix 8).

"It might not be faster to drive but it feels like it is. I mean, the bus stops and starts all the time with people getting on and off, I just think that wastes time I don't have. In my car I can control how fast I get somewhere" (Respondent 6)

Similarly, those aged between 36 and 55 showed clear attachment to their cars (Respondent 3; Appendix 5) (Figure 4.3).

"To be honest... I can't imagine not driving, I can't see why anyone would want to go on the bus when they could go by car is just so much easier" (Respondent 3)

From the data collected, a key point can be identified. It is suggested that, past transport policies in Plymouth have been effective as those using bus services generally displayed positive attitudes towards them. In contrast, car users had much more negative attitudes to bus services. This therefore suggests that, the attitudes of non-users are based on perceptions rather than experience and as noted by Currie and Wallis (2008, p.425), perceptions of travel quality have a 'critical influence on travel behaviour'. For example, over 20 per cent of car users stated they felt

Plymouth's bus services were unreliable (Figure 4.5) when in fact, bus punctuality in the city is ahead of target[30] with 86 per cent of buses running on time (PCC, 2008c).

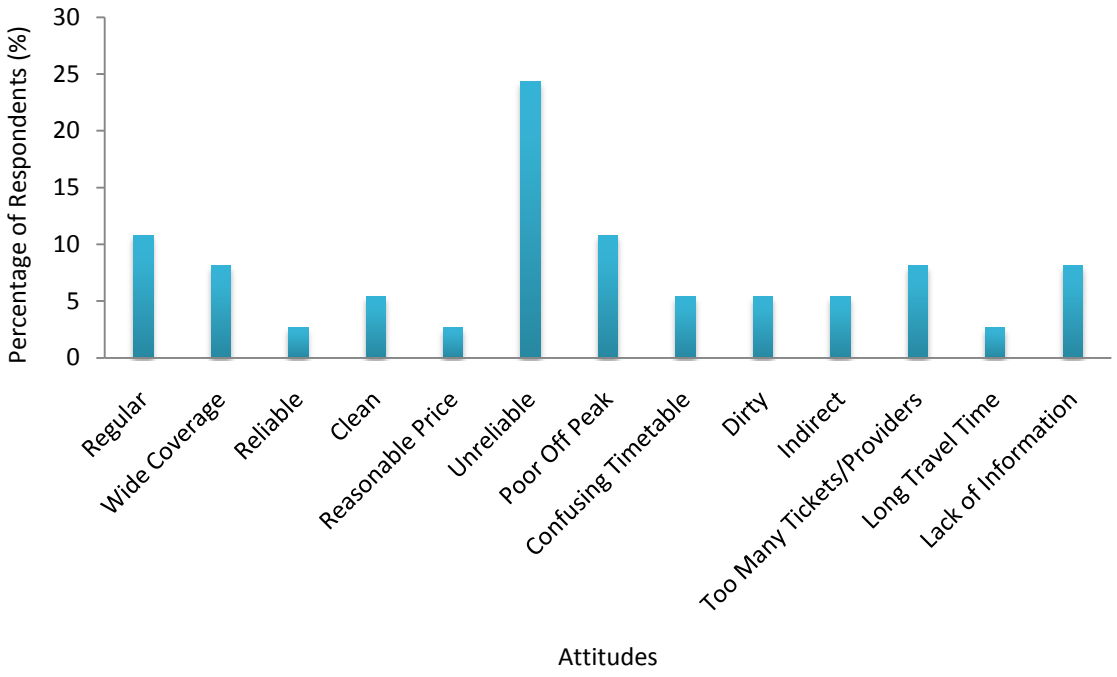

Figure 4.5: Car user attitudes towards bus services in Plymouth

Misinformed judgements, such as these, are sure to influence transport mode choice in Plymouth. It can therefore be suggested that by encouraging non-users to gain experience of Plymouth's bus services, their negative attitudes and perceptions can be altered (Brown *et al*., 2003).

Experience of bus services in Plymouth could be gained by non-users through the introduction of free or discounted travel cards. It is argued that, this will close the gap between perception and reality of public transport in Plymouth. A similar initiative was implemented in Aarhus, Denmark[31], where a free one month travel card was issued to drivers (Thogersen, 2009). The aim was to create sufficient initial interest to entice new customers to use bus services. Thereafter, it was hoped that, the positive experience gained would foster a change in transport mode. In Copenhagen, Denmark, a similar scheme doubled bus patronage for six months whilst strengthening driver's intentions to commute by public transport in the future (Thogersen, 2009) and in Brussels, take up of a free season ticket reached 8000 within one month (Witte *et al*., 2006).

Due to the slightly smaller size of Plymouth by comparison, a free promotion, covering bus services, lasting two weeks may be more financially feasible. Advertisement of the free travel card to car drivers, through outlets such as local news and radio, would be vital to its success, as lack of awareness is suggested to be the major downfall of many local transport initiatives (Curtis and Headicar, 1997).

[30] Target of 75 per cent of buses running between one minute early and five minutes late set by LTP2 (2006-2011) (PCC, 2006a).

[31] Aarhus is a coastal city with a population of around 300,000 people, only slightly larger than the city of Plymouth with its population of just over 250,000 (Visit Aarhus, 2010).

The positivity of bus users towards services suggests that, on the whole, bus services in Plymouth are satisfactory and could leave drivers with positive attitudes leading to a future mode change. However, the success of the scheme will also depend on the capacity of bus services to provide certain service quality aspects required by both users and non-users. Additionally, the factors considered when choosing a transport mode must be applicable to all modes as will be discussed in the following sections.

Factors Influencing Mode Choice

Along with varying attitudes towards transport modes were varying motivational factors in mode choice between user and social groups. Firstly, car users stated that convenience, flexibility, travel time and comfort were most important when choosing a transport mode (Figure 4.6). One female respondent suggested she chose to drive as a car enabled flexibility and multi-tasking (Respondent 1; Appendix 3) and another noted speed and convenience (Respondent 6; Appendix 8).

"If I'm driving I can go via the shops on the way back from work and pick up the kids...just make stops off on the way. That wouldn't be very easy if I was on the bus, having to stick to the route and get on and off and wait around" (Respondent 1)

"The car is just so much faster and more convenient, I don't have to wait around for it to arrive it's just there" (Respondent 6)

In contrast, bus users chose factors such as frequency, reliability and cost (Figure 4.6) (Respondent 2; Appendix 4).

"I can't really afford a car at the moment and to be honest even if I had one I think the bus would still be a lot cheaper" (Respondent 2)

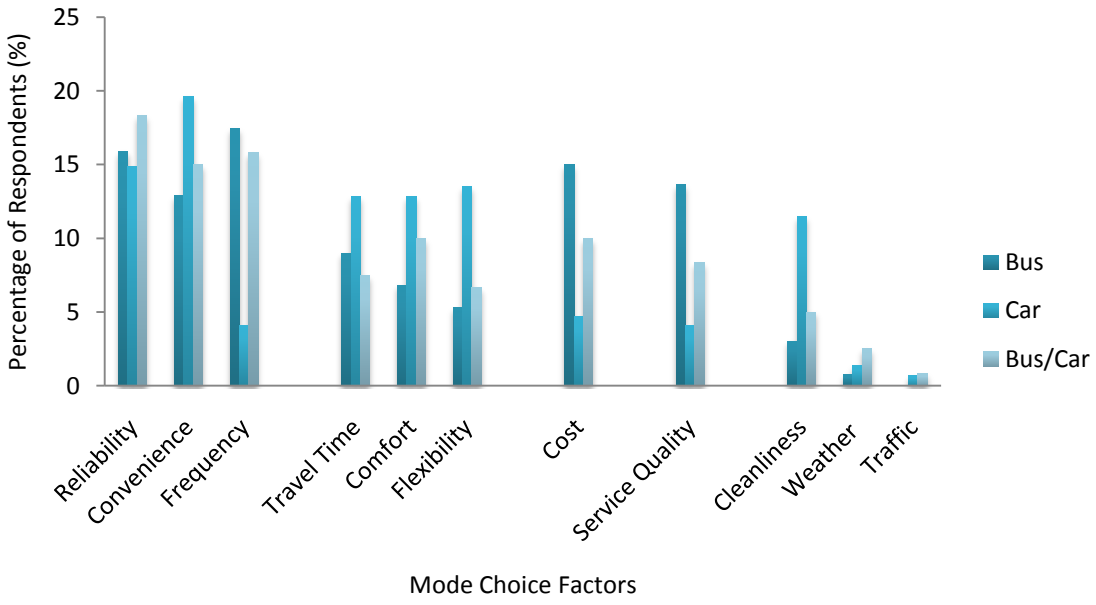

Figure 4.6: Factors influencing mode choice by user group

Both gender groups displayed differing motivating factors also. Male respondents saw convenience, travel time and reliability as the most important factors (Figure 4.7) (Respondent 3; Appendix 5).

"I want to get where I am going as fast as I can, which I think means using the car' (Respondent 3)

In contrast, female respondents saw comfort, flexibility and cleanliness as more important (Figure 4.7) (Respondent 1; Appendix 3; Respondent 5; Appendix 7).

'I don't want to travel on a dirty uncomfortable bus when I could be in my own car" (Respondent 1)

"I like to be able to go where I choose, not where the bus takes me" (Respondent 5)

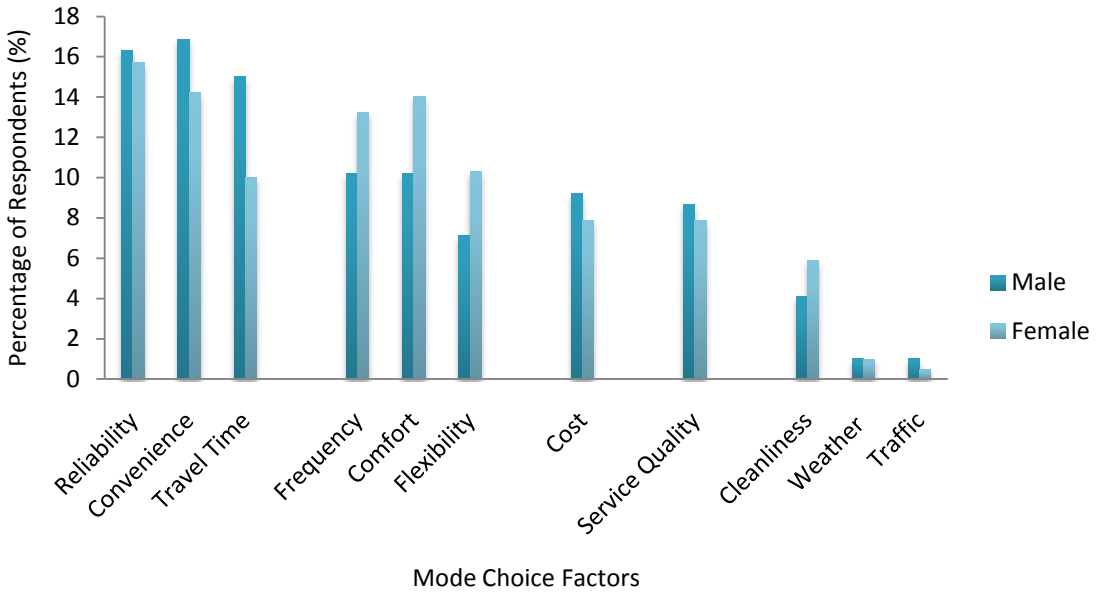

Figure 4.7: Factors influencing mode choice by gender

In addition, those aged under 35 saw cost and convenience as key mode choice factors (Respondent 2; Appendix 4) while those aged over 65 suggested comfort and service quality were the most important factors (Figure 4.8).

"Cost is always something I have to think about, I have a young family to support so it definitely affects how I travel" (Respondent 2)

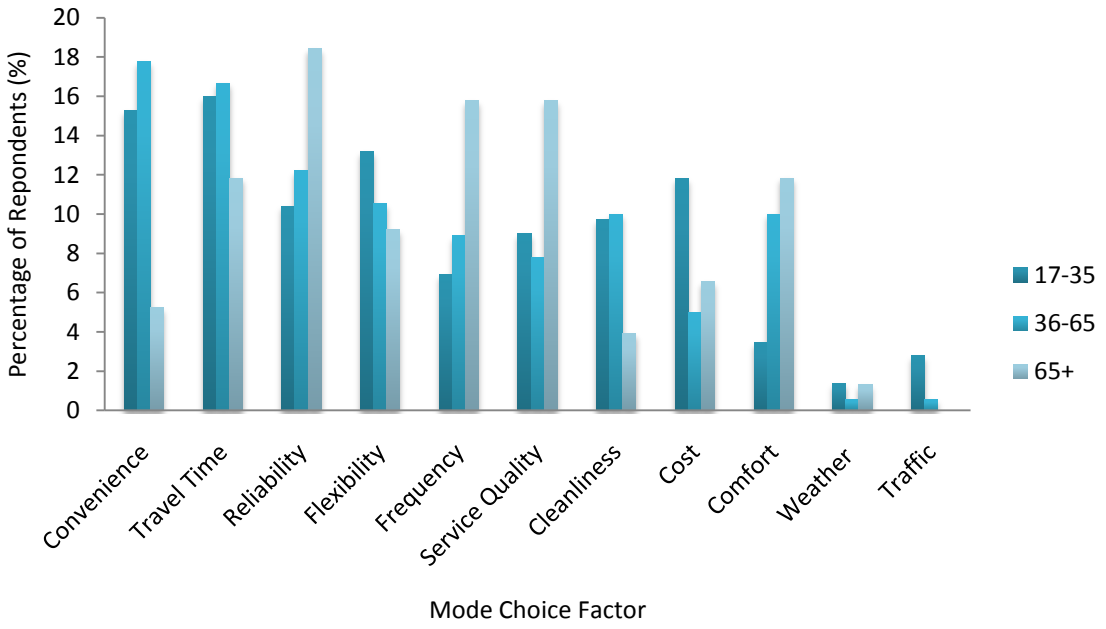

Figure 4.8: Factors influencing mode choice by age group

Those aged between 35-65 saw travel time, comfort and reliability as influential factors (Respondent 8; Appendix 10).

> "Reliability is important, my car is never late and it doesn't stop all the time unlike going on the bus. I don't consider reliability with my car because I don't have to" (Respondent 8)

The clear variance in mode choice factors for different user groups enforces the importance of this type of study. In order for policy initiatives aiming to encourage public transport use to be effective, the factors affecting the mode choice of various groups must be considered (Beirao and Cabral, 2007). If car users choose transport based on flexibility and travel time, bus services must be made more flexible by increasing route options, bus frequency and bus priority[32] for them to be considered a realistic option. Comfort and cleanliness improvement on bus services could potentially attract more women and elderly passengers while improving travel time attracts those in full time work. It must be recognised, however, that different user/social groups are influenced by different factors when choosing their transport mode. For instance, a reduction in the price of bus services may encourage bus use by those aged under 25, for whom cost is an influential factor, but will have little impact on those aged between 36 and 55 on higher incomes, for whom cost in not a motivating factor.

Policy emphasizing various service attributes should be targeted towards those for whom they are important. It is suggested that, in Plymouth, a targeted marketing campaign is essential in order for bus service quality to be highlighted. It is suggested that 'soft policies such as market communication, motivation and information are as effective as hard policies such as system improvement' (Jeuring and Gun, 2009, p.1). Beale and Bonsall (2007) noted the most realistic way of marketing directly to car users, is to target them whilst they are using their cars. For

[32] Bus priority measures include increasing the number and policing bus priority lanes and traffic calming measures such as speed limit reductions (Wright and Egan, 2000).

instance, bus quality attributes advertised through marketing material in petrol stations, on local radio stations and in car parks. Additionally, advertisement aimed at specific age and gender groups highlighting service attributes seen as important to them may have an impact.

Public transport marketing strategies have seen much success as noted by Jeuring and Gun (2009) who identified various local marketing schemes used in other small-medium sized cities[33]. Stagecoach, in the UK, made use of data such as that identified in this study. They segmented/stratified the market for bus travel according to socio-economic characteristics and targeted telemarketing and direct mail to specific groups. The team of only 20 people claims to have generated 4.2 million additional bus trips per year which formally would have been made by car (Jeuring and Gun, 2009). Additionally, marketing strategies across Europe have aimed to use branding and corporate design[34] to 'remarket the bus' (Jeuring and Gun, 2009, p.8).

However, Beale and Bonsall (2007, p.278) warned against the impact of 'unintended consequences' as marketing aimed at influencing a certain groups behaviour may have a completely different effect on another group[35]. Additionally, although localised marketing is essential if attitudes towards bus services are to be altered, a long term national car 'de-marketing' strategy[36] must play a role (Wright and Egan, 2000, p.287).

The feasibility of such a measure in Plymouth is difficult to judge. It can be suggested that marketing is an essential tool which currently is not being maximised. Success will depend on the use of up to date information about the market and the quality of the service[37] and the accurate adjustment of the marketing mix (product, place, price, promotion) (Jeuring and Gun, 2009, p.2). Although in many instances marketing may be seen as a high cost strategy (Stradling, 2002), simplistic measures, such as those suggested above, targeted correctly could have positive effects on increasing bus patronage and changing attitudes towards public transport in Plymouth.

Transport Mode and Journey Type

The findings of this study identified the use of cars and buses for different journey types by different groups of people. Bus users used buses predominantly for travelling to and from work and to leisure facilities. Combined users[38] also used buses for travelling to work but interestingly used cars for shopping and taking

[33] Cities with a maximum population of 300,000 (Jeuring and Gun, 2009).

[34] In Kristiansand, the idea of 'Think Tram Use Bus' was used to integrate the design of local public transport systems in order to ease the transition between tram and bus travel, thereby playing on the positive attitudes which already exist towards tram use (Jeuring and Gun, 2009).

[35] Beale and Bonsall (2007, p.280) found that marketing material promoting bus use which is overly 'anti-car' was seen to impact negatively on car user attitudes towards bus use as they often felt their behaviour was being criticised.

[36] An example of a de-marketing strategy against car use can be seen in the 1980s British Rail television advert with the tagline 'let the train take the strain'. Rail passengers were shown to be relaxing comfortably on the train whilst the British countryside flashed by outside the window. Running parallel with the railway line was a motorway where cars were seen to be crawling along by comparison (Wright and Egan, 2000).

[37] Information about regular and non regular public transport users, the quality of the public transport service, social characteristics, travel motives, expectations and the image of the system etc (Jeuring and Gun, 2009). Some of which have been highlighted in this study.

[38] Those using a combination of buses and cars.

children to school (Figure 4.9) (Respondent 4; Appendix 6; Respondent 10; Appendix 12).

"It's not really possible for me to go food shopping for a week's worth of food for two people on the bus' (Respondent 4)

"Taking the kids on the bus is too much effort and too expensive' (Respondent 10).

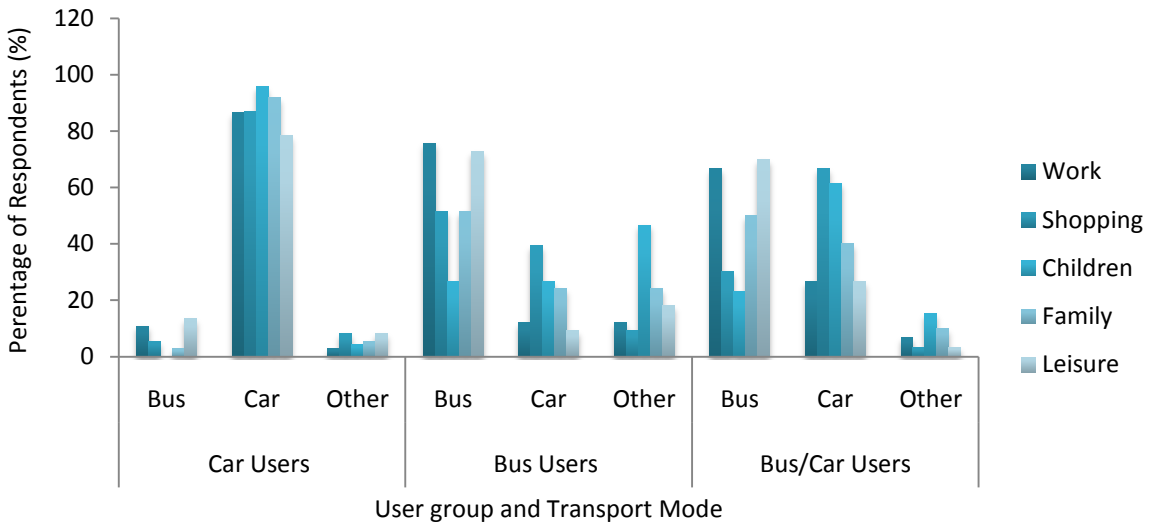

Figure 4.9: Journey type and transport mode by user group

The results identify a clear divergence in the use of transport modes for different journeys. As Davison and Knowles (2006) noted, in order for government policy to be a success, buses need to be able to encourage more car owners to leave their cars at home for specific journeys, in particular for journeys to work. A combination of various policies will be essential in order to achieve modal shift for journeys to work, it is suggested some of these policies could be used in Plymouth.

Firstly, employer travel plans have been seen to contribute to modal shift elsewhere. Travel plans[39] require organisations to 'develop measures to encourage staff to travel in more sustainable ways' (Roby, 2010, p.23). Measures include the provision of public transport information at the workplace, discounted season tickets, subsidy of new services and reducing parking supply. A travel plan initiative set up at Manchester Airport in 1999, in which public transport was discounted, car parking charges increased and cycle access improved, saw bus use double over a two year period[40]. In Plymouth, various travel plans already exist[41] and, in cooperation with bus operators in the city, ten companies[42] have use of the 'Green Staff Travel Pass' which offers a twelve per cent discount on monthly bus season tickets (PCC, 2010).

[39] The adoption of travel plans by employers was an important element of the Government's integrated transport strategy outlined in the 1998 White Paper *A New Deal for Transport: Better for Everyone* (Rye, 2002).
[40] In the same period, the proportion of staff driving to work alone fell from 83 per cent to 63 per cent, despite increasing staff numbers (Rye, 2002).
[41] Travel Plans are in place in Plymouth at various organisations including the University of Plymouth, Plymouth City Council and Derriford Hospital.
[42] Companies using the Green Travel Pass include EDF Energy, Plymouth City Council, Derriford Hospital, University of Plymouth and 118 118 The Number (PCC, 2010).

The success of the schemes currently operating is difficult to assess, however, the success of similar schemes elsewhere, demonstrates the potential. Nevertheless, the success of such a scheme in Plymouth will rely on the adoption of travel plans by a larger proportion of companies. In order for this to take place, it is suggested that, the potential benefits associated with travel plans, including reducing costs[43], must be advertised more thoroughly to employers in the city. Additionally, combining travel plans with a reduction in unsustainable fringe benefits[44] (Davison and Knowles, 2006) as well as applicable public transport improvements[45] will increase the likeliness of success. It is noted that, success in Plymouth is particularly realistic due its city status where public transport routes converge (Roby, 2010).

Encouraging Modal Shift

As Beirao and Cabral (2007) suggest, in order to compete with car travel, bus services must be made more attractive to potential users. In this study, potential users can be defined as those who show a willingness to use public transport more often which, as Beale and Bonsall (2007) note, is essential among non-users if a shift in travel behaviour is to occur. Overall, 71 per cent of all respondents showed a willingness to change. However, those most willing were respondents already using a combination of buses and cars (Figure 4.10) (Respondent 4; Appendix 6), males (Figure 4.11) and those aged under 35 (Figure 4.12).

"I would definitely be willing to go by bus more often, the service would have to be improved though" (Respondent 4)

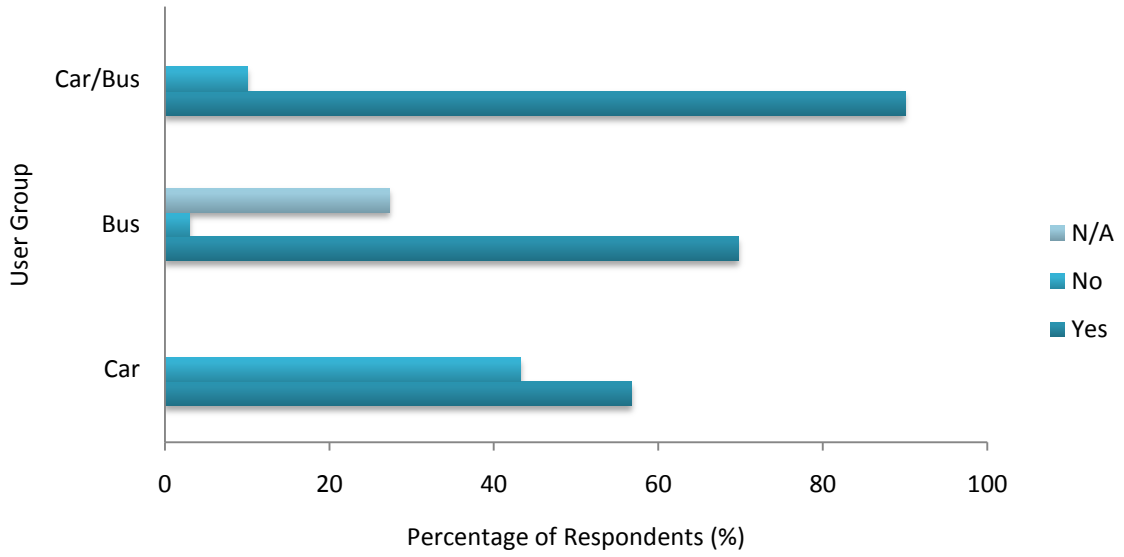

Figure 4.10: Willingness to change transport mode by user group

[43] The generation of cost reductions, the more efficient use of land for business space rather than car parking and the benefits to the local economy and environment should provide justification for the implementation of travel plans by employers in Plymouth (Roby, 2010).

[44] It has been noted that employers often encourage unsustainable transport choices through the provision of free parking and company cars which often come with petrol allowances (Davison and Knowles, 2005).

[45] Improving the frequency and coverage of off peak services will increase the ability of those working evening shifts to commute via public transport, for example.

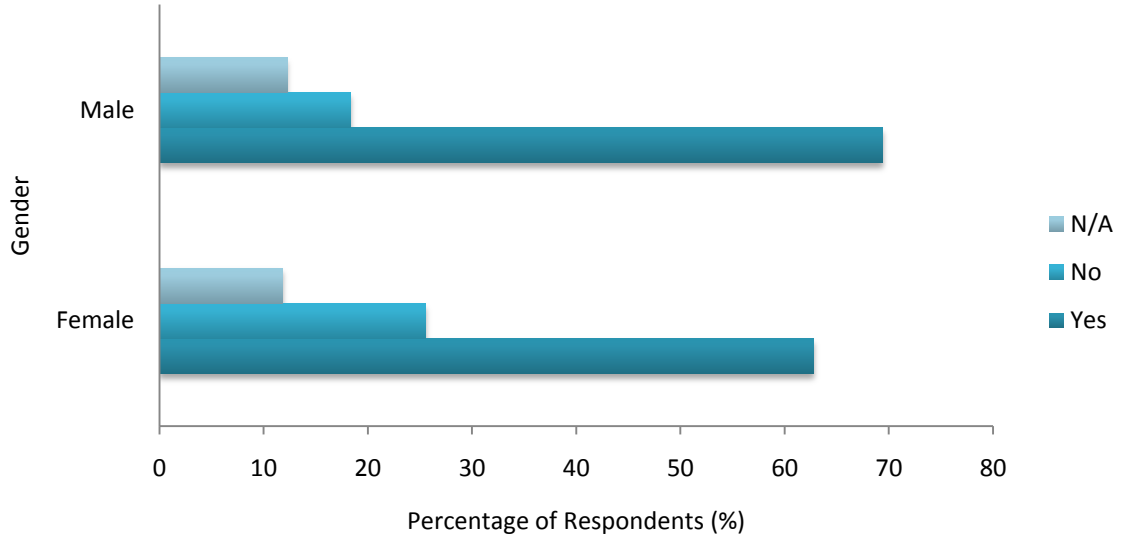

Figure 4.11: Willingness to change transport mode by gender

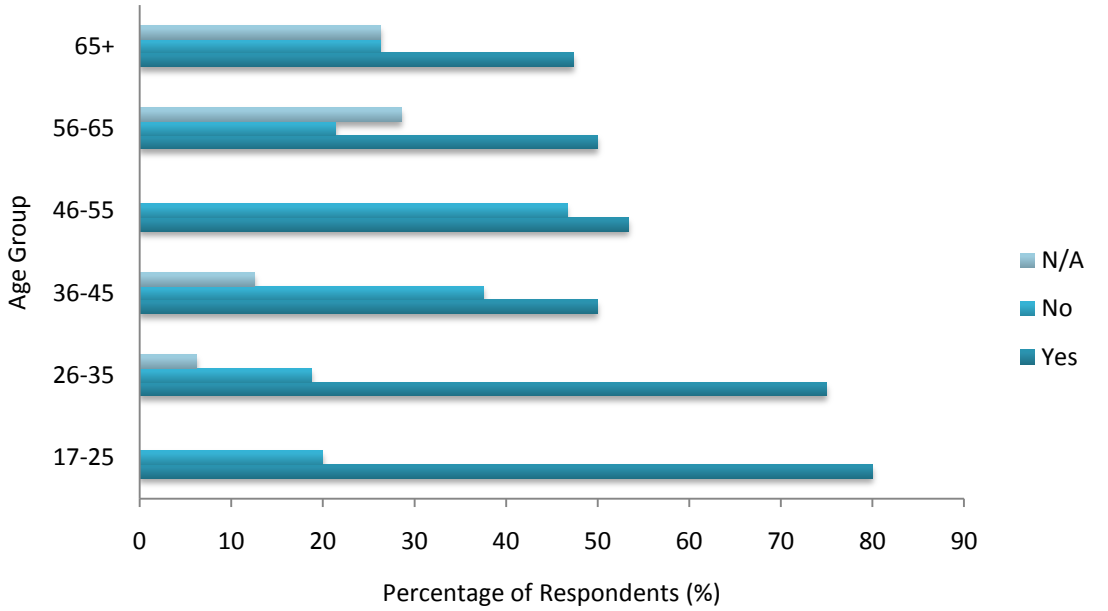

Figure 4.12: Willingness to change transport mode by age group

In contrast, those most unwilling to change modes were car users (Figure 4.10) (Respondent 1; Appendix 3), females (Figure 4.11) and those aged between 36 and 55 (Figure 4.12).

"I don't think buses will ever be able to let me do what I can do in my car so I really don't think I would bother" (Respondent 1)

In addition, various female respondents noted they were unwilling due to their perception of safety issues (Respondent 8; Appendix 10).

"I wouldn't feel safe walking around at night to get on and off buses and it's not very well lit on my estate" (Respondent 8)

There is therefore a variance in willingness to change. It is argued that, in order for policy to succeed, it should firstly target those most willing with the aim of an improvement in attitudes overall. It is thought this will later lead an increase in willingness on the whole[46]. After stating their 'willingness' to change transport modes, respondents were asked to suggest what would make them change. A wide range of responses were noted which enable the feasibility of various policy options to be identified. The most viable policy options include service quality improvements, a variety of 'push and pull' methods (Wright and Egan, 2000, p.290) and land use planning.

Firstly, it must be recognised that certain service quality improvements will motivate some people but not others. For instance, reducing the price of bus services was cited as a motivating factor for public transport use most commonly by those under 25 (Figure 4.13), those on a lower income and those who were unemployed.

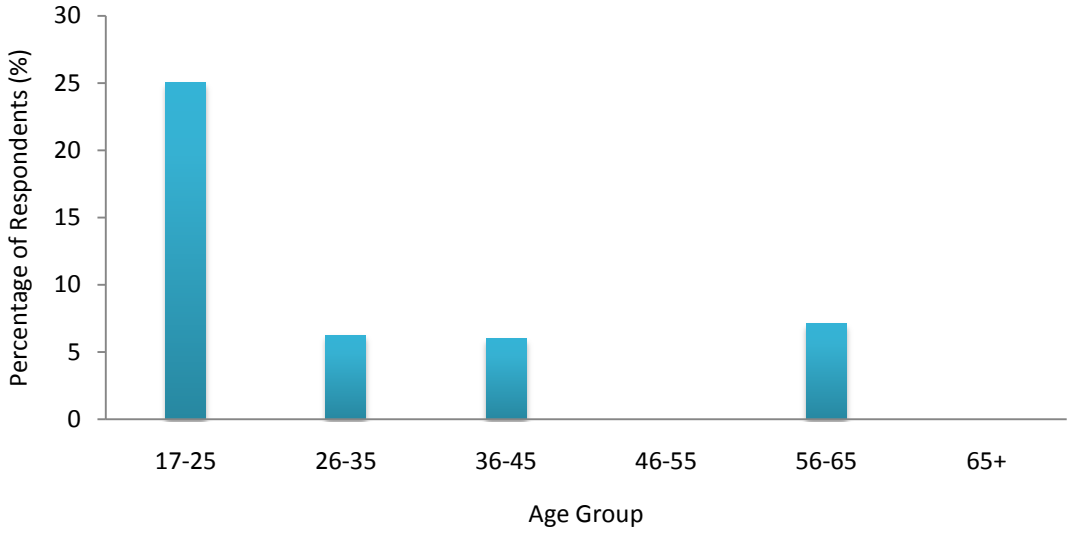

Figure 4.13: Factors to encourage modal shift: Reduced public transport cost

Therefore, it is likely that a reduction in ticket prices will have a more significant impact on modal shift within these groups. Fitzroy and Smith (1998) stated that changes in fare prices, coupled with service quality improvements, are the twin transport variables with the most direct influence on patronage. Moreover, Davison and Knowles (2006) noted that people often perceive they are paying more for public transport due to the method of payment by cash[47]. They therefore suggest the introduction of smart/travel cards[48] to alleviate this problem. Additionally, smart cards can reduce boarding time enabling faster transit (Bagchi and White, 2005), an

[46] It is hoped that as those currently unwilling members of the public see service quality improvements, increasing patronage and an increase in the image of public transport/bus services as a whole, they will be more open to modal shift in the future (Anable, 2005).

[47] In contrast, car users are able to pay for petrol, insurance and tax by debit or credit card which creates the illusion that car use is actually cheaper than public transport. In fact, it is estimated that travelling by car costs, on average, between £0.40 and £0.50 per mile (Davison and Knowles, 2006).

[48] Smart cards have a similar look and size to a credit card and hold a stored monetary value. An example can be seen in the Oyster card currently operating in London with over 2.5 million holders (Bagchi and White, 2005).

attractive feature identified by other groups studied[49]. In Plymouth, the *Bus Strategy* as part of *LTP2* set out the idea to trial smart cards on bus services in the city with various advantages (Box 4.1).

- Reduced fraud
- More accurate reimbursement of concessionary tickets
- More personalised ticketing
- Integrated and multi-modal ticketing
- Multi-product ticketing i.e. leisure and bus travel
- Multiple ticketing products on one card i.e. commercial and concessionary
- Inter-operable ticketing
- Immediate card control and withdrawal
- Speed bus loading

Box 4.1: The benefits of smart card use in Plymouth (PCC, 2006a)

It can therefore be suggested that the introduction of smart cards is a feasible option in Plymouth and it may also solve other issues suggested by respondents. Over 20 per cent of combined bus/car users stated that an improved ticketing system would encourage them to use bus services more often.

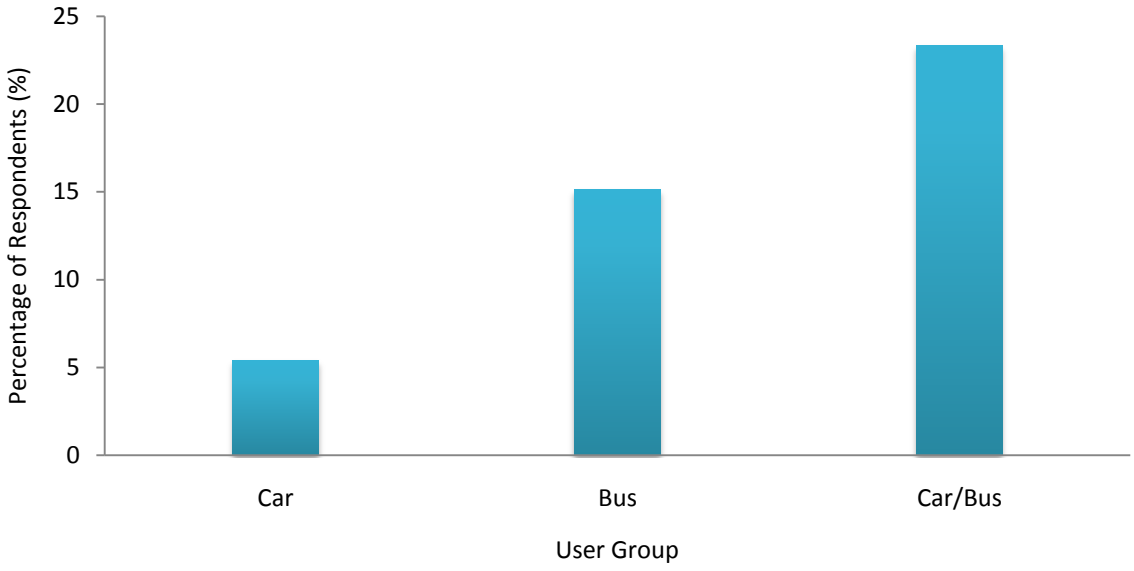

Figure 4.14: Factors to encourage modal shift: Improved ticketing system

Therefore, the introduction of a smart card enabling easy payment on all operators in the city will potentially encourage increased bus use by those currently combining bus use with car use as well as those mentioned above.

[49] A faster travel time by bus was noted as a way to encourage bus use by car users, male respondents and those aged between 36-55.

Other potential users[50] identified in this study suggested that an improvement in evening and weekend services would encourage them to use Plymouth's bus services more often (Respondent 4; Appendix 6; Respondent 10; Appendix 12).

"There definitely aren't enough buses at night and weekends. I don't think you can expect people to wait around at night I mean surely its stupid to allow young women like me to stand around at night in the dark alone waiting for a bus. I would consider it more seriously if I could jump on a bus at night as easily as I can in the day" (Respondent 4)

"I think the main thing would be if the later services were extended. There needs to be more buses running later at night and even more on weekends" (Respondent10)

At present, Plymouth's off-peak bus services are poor and Table 4.1 demonstrates the serious shortage of evening and weekend services on many bus routes in the city.

Table 4.1: Plymouth Bus Service Frequency (PCC, 2006b)

	Mon-Sat Peak	**Mon-Sat Evening**	**Sunday and Bank Holidays**
	Buses per Hour	**Buses per Hour**	**Buses per Hour**
Northern Corridor			
Derriford Hospital Departures	41.5	13	13
Mutley Plain	33.5	8	9.5
Outland Road	8	2	1
Tavistock Road (Derriford - Roborough)	8.5	3	3.8
Tavistock Road (Manadon-Derriford)	29.5	9	8.8
Western Corridor			
St Budeaux Square	29	8	8
Union Street	16	4	3
Pemros Road	11	2.75	3
Wolseley Road	28	8	8
Eastern Corridor			
Billacombe Road	4	1	1
Elburton Road	3	0	0
Exeter Street	29.5	8	9
Laira Bridge Road	19	4.5	5.5
Lipson Vale	9	3	3
Plympton Ridgeway	8.5	1.5	1.5
Plymstock Broadway	10	3	4
City Centre			
Royal Parade	140	39	44

Increasing the frequency of bus services on evenings and weekends would enable those working shifts to consider bus travel as a more realistic option. In addition,

[50] Respondents in full time work, car drivers and a combination of men and women.

respondents who stated they would be more likely to travel by bus if bus timetables fitted their work schedules[51] would also be more likely to change modes. As Table 4.1 demonstrates, there is much scope for improvement and already progress has been made in Plymouth with the increase in off-peak services to accommodate the 20-hour shift pattern of the call centres at Langage Industrial Estate (PCC, 2006b). In addition, as part of *LTP2*, PCC plan to extend off-peak services to other key growth areas across the city; a strategy which will plausibly increase patronage by those identified in this study.

Other service improvements are seen as essential for modal shift by other groups. For instance, those over 65 stated an improvement in disabled access through the provision of more 'low rider' buses, women suggested feeling safer, male respondents suggested faster journey times and car users stated more frequent bus services. It is suggested that these suggestions can be implemented in Plymouth. Investment in low rider buses is planned in *LTP2*[52] *and a*n increase in on-board security as well as improving bus shelters and street lighting will reduce safety fears (Fitzroy and Smith, 1998). In addition, the provision of more bus lanes will increase journey times (Davison and Knowles, 2006) and advertisement and investment in Real Time Passenger Information (RTPI) systems will increase awareness (Wall and McDonald, 2007).

In addition to the various service quality improvements mentioned above, other policy initiatives will be essential. Service quality improvements are often noted as 'pull measures' aimed at pulling car users out of their cars. However, it is suggested that a combination of push and pull methods will be necessary to create significant modal shift. Wright and Egan (2000) noted increasing vehicle/fuel taxation, road pricing and parking control as push methods to force people out of their cars. In this study, 15 per cent of car drivers stated they would have to be forced out of their cars in order for them to consider using buses. Moreover, the use of land use planning will also be essential in order to achieve modal shift (Gauzin-Muller, 2002). Schwanen and Mokhtarian (2005) noted a decrease in car use with higher density, mixed use and pedestrian friendly development (Tolley, 2003). The development planned at Sherford to the east of Plymouth is set to achieve 'sustainable travel behaviour' through high density development[53], internal provision of services and a park and ride bus link into the city (South Hams District Council, 2007). It is therefore clear that both strategies stated here are viable options in Plymouth.

The potential for success from implementation of such methods in Plymouth can be seen in Freiburg, Germany. The successful combination of push/pull policies[54] in Freiburg has led to its reputation as 'a model of successful transport planning' (Fitzroy and Smith (1998, p. 163). The introduction of schemes such as those suggested above[55] doubled patronage on local public transport (1983-1995). With a population just under that of Plymouth at 227,000, the city saw falling patronage

[51] Predominately car drivers between the ages of 35-45 in full time work.

[52] Already progress has been made with the provision of low floor buses increasing by 81 per cent (2001-2006). In addition, PCC 'pioneered' the development and production of Charcon curbs to enable low-floor easy access to buses (PCC, 2006b, p.16).

[53] Overall housing densities are to average between 40-50 developments per hectare (South Hams District Council, 2007).

[54] The use of incentives to encourage public transport use and disincentives to deter car use.

[55] Promotional travel cards, pedestrianisation, high parking charges and land use planning.

despite an increase in bus service and quality provision during the 1970s (Fitzroy and Smith, 1998). At present, a similar situation can be seen in Plymouth, it is therefore suggested that, the implementation of similar schemes could replicate Freiburg's success.

Summary

A wide range of evidence has been collected, analysed and the policy options discussed. The key finding identified in this study has been the divergence in attitudes and opinions that exists between user and social groups. The study has therefore identified that, at the local level, significant market segmentation is essential in order for policy to be effective. It is also clear that although significant progress with the improvement of public transport in Plymouth has been made, shown through the positive attitudes of many bus users towards services, there is still scope for further improvement. The feasibility of various policy options in the city have been mentioned, however, overall it can be suggested that advertisement and marketing of services to those most willing will be the most viable way of increasing awareness as marketing activities focussed towards addicted car users will be of little use (Jeuring and Gun, 2009). Thereafter, the other policy options mentioned[56] would have a more noteworthy result. In addition, the combination of actions taken at various levels of government will be essential. Combining local marketing initiatives, service improvements and promotional activities with national marketing and re-branding of the bus as a transport mode will be crucial in moving towards more sustainable transport (Beale and Bonsall, 2007).

Having analysed and discussed the results of the study, the context of the study and its contribution to the wider study of sustainable transport must be identified. Chapter 5 will place this study in context whilst noting important avenues for future research.

5. Conclusion

The aim of this study was to investigate public attitudes towards public transport and the private car in Plymouth. The study has identified a range of issues related to bus and car use in the city and has identified the most feasible options for future policy. However, as Thogersen (2009) notes, the reality of achieving sustainable transport lies in a combination of disincentives for car use[57], the effective promotion of public transport[58] and the aid of land use planning. It is suggested that, without a combination of such measures the future for sustainable transport, for increasing bus patronage and for reducing car dependency, is bleak.

In addition, Davison and Knowles (2006) stated that, success will depend on effective cooperation between Local Authorities and bus operating companies. In Plymouth, in December 2009, the council owned Bus Company Plymouth Citybus Ltd was sold to a private company with potentially harmful implications on bus service provision (This is Plymouth, 2009). With a profit driven company taking over 75 per cent of Plymouth's bus network (PCC, 2006a), it is feared some unprofitable, non-radial routes may be discontinued. Not only would such a scenario impact those directly affected, it could potentially impact public opinion towards bus provision in

[56] Promotional discounted travel cards, employer travel plans, integrated ticketing etc.

[57] Increasing car parking charges, reducing car parking supply, road pricing measures, traffic calming measures and increasing the price of car use relative to public transport use.

[58] Targeted marketing and advertisement towards those most willing, travel card promotions, integrated ticketing, and bus service quality improvements.

the city as a whole with definite consequences for modal shift. It is therefore essential that collaboration between the Local Authority and all the Bus Companies operating in Plymouth takes place if sustainable transport is to be achieved.

As previously noted, there have been various studies investigating attitudes towards transport modes. However, this study has aimed to combine the aspects of attitudinal study with the study of the modal shift potential associated with such attitudes. In addition, the study has identified various policy options for PCC to follow in the coming years to achieve its sustainable transport objectives as laid out in *LTP2*. The study has provided new insight into the difficulties and opportunities associated with public transport provision in Plymouth; at the local level. It has also identified the importance of identifying attitudinal/behavioural trends within various social groups in order to achieve policy goals in transport provision.

Therefore, it is suggested that future research must focus on looking deeper into this field. Researchers should aim to investigate the transport behaviour of individual social groups, for instance, a comparison between male and female behaviours or the behaviours of those working part time and full time. In addition, it will be important to study the impact of location on travel behaviour in order to identify problem areas and gaps in provision. These avenues for research will aid policy makers further in designing applicable, implementable and successful initiatives.

Is there a sustainable transport future for Plymouth?

The findings of this study and the relevant transport literature suggest there is a sustainable transport future for Plymouth. The miss-matched patronage targets coupled with increasing car use and poor off-peak service provision indicate the scope for improvement however, the impressive progress made already in terms of positive attitudes towards bus use by users suggest sustainable options in the future are feasible. The various options discussed in Chapter 4 are all achievable with the correct implementation and, as discussed, many have been used elsewhere to great avail. However, arguably, success lies in the hands of the public and as Currie and Wallis (2008, p.425) suggest, they must be at 'the centre of transport provision'. Without the identification of the attitudes and opinions of the public through studies such as this, policy will be ineffective.

An emphasis in this study has been placed on sustainable transport provision at the local level, however, the nature of the problem of unsustainable behaviour is one affecting actions taken at the national and international level (Banister, 2005). The nature of environmental change is such that action is required from all levels of society, arguably stemming from actions taken by the individual (Black and Nijkamp, 2002). It must therefore be noted that studies such as this enable more precise decision making at the local level which will have a knock-on effect at the national level and international level (and vice versa).

As Masson (2006, p.58) states, 'now is an opportune time' to reduce car dependency and increase the usage of more sustainable modes as 'transport is in crisis' with current patterns of car use having extreme environmental, social and economic costs[59] (Stradling *et al*., 2000, p.207). In addition, by 2050, it is estimated that over two thirds of the world's population will live in urban areas (UN Habitat, 2009). It is

[59] Road casualties, pollution contributing to global warming, social isolation and deprivation and resource depletion (Stradling *et al*., 2000).

therefore essential to design effective transport policies to cope with the increasing demand on public transport systems (Cullinane, 2003). In order to contribute to sustainable development on the whole, Local Authorities, such as that of Plymouth, must devise applicable transport policy and implement it without delay (Newman and Kenworthy, 1999). As Schwanen and Mokhtarian (2005, p.85) stated 'insights into the role of attitudinal factors are needed to formulate auto-use reducing policies that are more realistic in their objectives and more effective in terms of their outcomes'. The future for successful transport policy formulation, therefore, lies in the further and continued study of attitudes towards transport modes.

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